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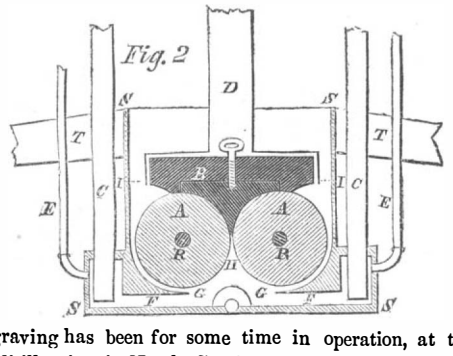
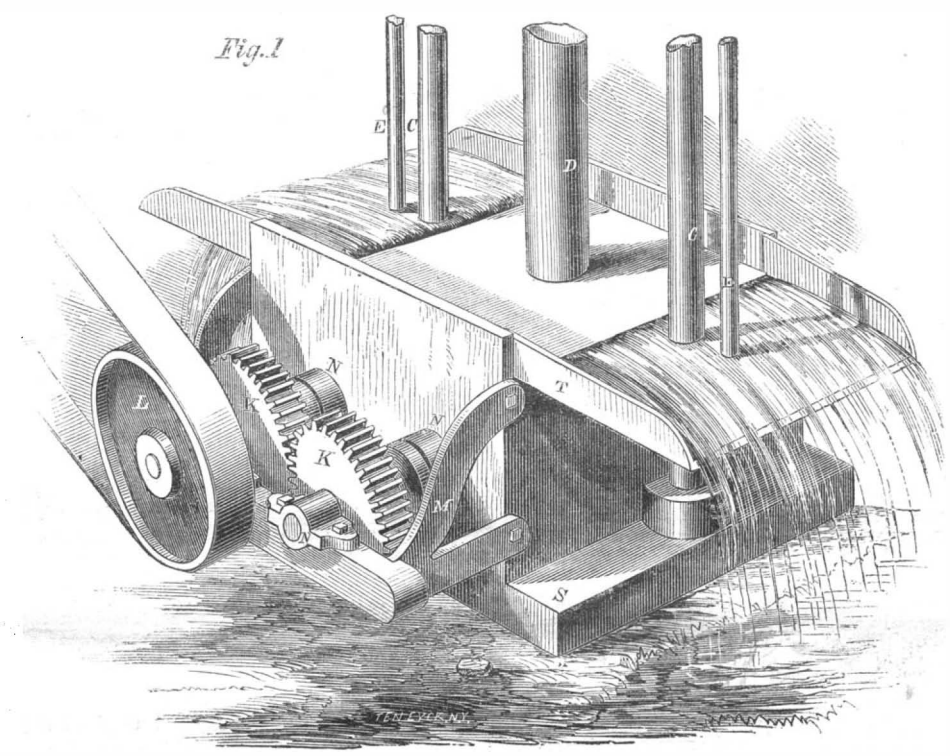
BARKER'S AMALGAMATOR.

Wherever gold is found on the surface of the earth, it almost invariably occurs in gneiss and other metamorphic rocks, having both a crystalline and stratified structure. The gold is found in the quartz veins which traverse these rocks, and generally in very minute particles. In the immeasurable ages which have passed away since the metamorphic rocks were first deposited in strata at the bottoms of ancient seas, and afterwards crystallized by heat and heaved up into their present position, rivers have been wearing channels in their sloping sides, bearing away the lighter substance to the sea, and leaving the gold mingled with gravel along the river beds. It is this gold, already separated from the quartz, which is obtained by the placer washings. But in some places the quartz, still wedged between the walls of stratified quartz, is sufficiently rich in gold to pay for all the labor of blasting it out, crushing it in mills, and extracting the gold. Much of this gold is in minute sheets so exceedingly thin as to be compared to nothing but a *stain* in the quartz, and the best way hitherto discovered of separating it from the quartz is to pass the pulverized material through mercury, which has the property of dissolving the gold, or rather as it is technically called, of amalgamating with it. It is found that a considerable portion of the gold will pass away without combining with the mercury, unless the two metals are brought into very close and somewhat continued contact, and various contrivances have been formed for obtaining the best contact to secure the most thorough amalgamation of the gold. The amalgamator illustrated in the accompanying



engraving has been for some time in operation, at the Rudisill mine in North Carolina, where it has so won the approval of the owners and managers that they recommend it in the strongest manner.

Fig. 1 is a perspective view, and Fig. 2 a vertical section. The rollers, A A, of chilled iron, are made to rotate with slightly different velocities (by means of the pinions, K K, which have a different number of teeth) in an iron chamber, *s s s s*, which is filled with mercury to I I. Resting upon the rollers is the iron rubber, B, the lower surface of which is fashioned to conform to the contour of the rollers. The pulverized quartz and gold are introduced in suspension in water through the pipes, C C, which rise to a sufficient hight for the head of water to force the mass under the surface of the mercury, and along the channels, F F, to the points, G G, whence it passes between the rollers at H, and is carried over the rollers in a thin sheet under the rubber, B, where it is pressed, rubbed and ground in contact with the mercury, thus insuring an amalgamation with the very smallest particles of gold. The water and quartz, being lighter than the mercury, rise to the surface and flow out through the spouts, T T, at each side of the machine. For a more thorough washing of the gold from any particles of mud or other foreign substance that may adhere to it, an additional supply of water is introduced through the pipes, E E, and D, which are so arranged as to carry the water under the surface of the mercury and mix it with the pulverized quartz in its passage through the machine.



BARKER'S IMPROVED AMALGAMATOR.

The patent for this invention was issued, Jan. 18, 1859, and persons desiring further information in relation to it will please address the inventors, John & E. W. Barker, at Baltimore, Md.

PRINTING IN COLORS.

L'Invention, for December, 1859, has an account of an improvement in the art of printing in colors, which it says is applicable to the printing of calico, paper-hangings, and maps, as well as pictures, and which it pronounces of great importance in consequence of the cheapness of the process.

Our readers are aware that very great improvements have been made within a few years in the art of printing in colors by the lithographic process, chromo-lithography as it is called. One firm of lithographers in London have distinguished themselves especially by their improvements in this art. Oil colors are used, and we have seen some of their prints which it was really difficult to distinguish from oil pantings. The process consists in employing a stone of the full size of the print for each color and each shade. To place the paper with great precision on the several stones in succession, small pin points, secured firmly in the stone, project a short distance above its surface and pass through small holes in the paper. It is said that more than 30 stones were used in re-producing Church's painting of Niagara Falls. The great expense of this process adapts it only to high-priced prints.

The object of the improvement of which we find an account in *L'Invention*, is to lessen the expense of this process, and the mode in which it is sought to be done is to produce all the colors and shades desired by combinations of the three primitive colors—red, yellow and blue. Our readers are aware that all the colors of the rainbow may be produced by combining these three colors. When a ray of white light passes through a triangular prism of glass, the seven colored rays of which it is composed are bent from their straight course, and as they are bent unequally, they are thus separated from each other. The color which is bent least is the red, and the colors are seen on a screen in this relation:—violet, indigo, blue, green, yellow, red. Now it is found that the red and yellow combined will produce orange, which, it will be seen, is between them in the spectrum. Yellow and blue will produce green, and blue and red will produce indigo and violet. Red, yellow and blue are consequently called the *primitive* colors; the French call them the *mother* colors. The Messrs. Avril, the inventors of the process of which we have spoken, avail themselves of this prolific property of the primitive colors, to reduce the number of stones, or rather of printing plates. This plan was tried many years ago in application to the printing of line-engravings, but owing to the fact that the sheets of paper must be moistened for printing in line, in order that the paper may be soft enough to be pressed into the channels in the metallic plate, it was found impossible to place them with sufficient accuracy on the successive plates. It is consequently necessary, in order to print several colors in succession, upon one sheet of paper to keep the paper dry, and in order to do this, the Messrs. Avril hit upon the plan of reversing the process of line-engraving—printing from the raised surface and producing the lights from depressions as in wood-cuts.

The plan, then, is to engrave a copper plate by cutting away the parts intended for the lights in the picture, leaving the parts for the colors raised—to have three of these plates, one for the red, one for the yellow, and one for the blue—and to so arrange these colors that they will overlie each other in a proper manner to produce the various shades and colors desired.

NEW GUN.—Colonel Colt has invented a revolving shot gun. It is said that upon a late trial of this valuable gun, at a distance of 30 yards, it put 175 pellets in a circle of 12 inches diameter, penetrating 75 sheets of ordinary brown paper, the shot used being No. 6 shot, 1¼ ounces and 2 drachms of powder to each charge. The gun is a five-shooter.—*New York Tribune.*

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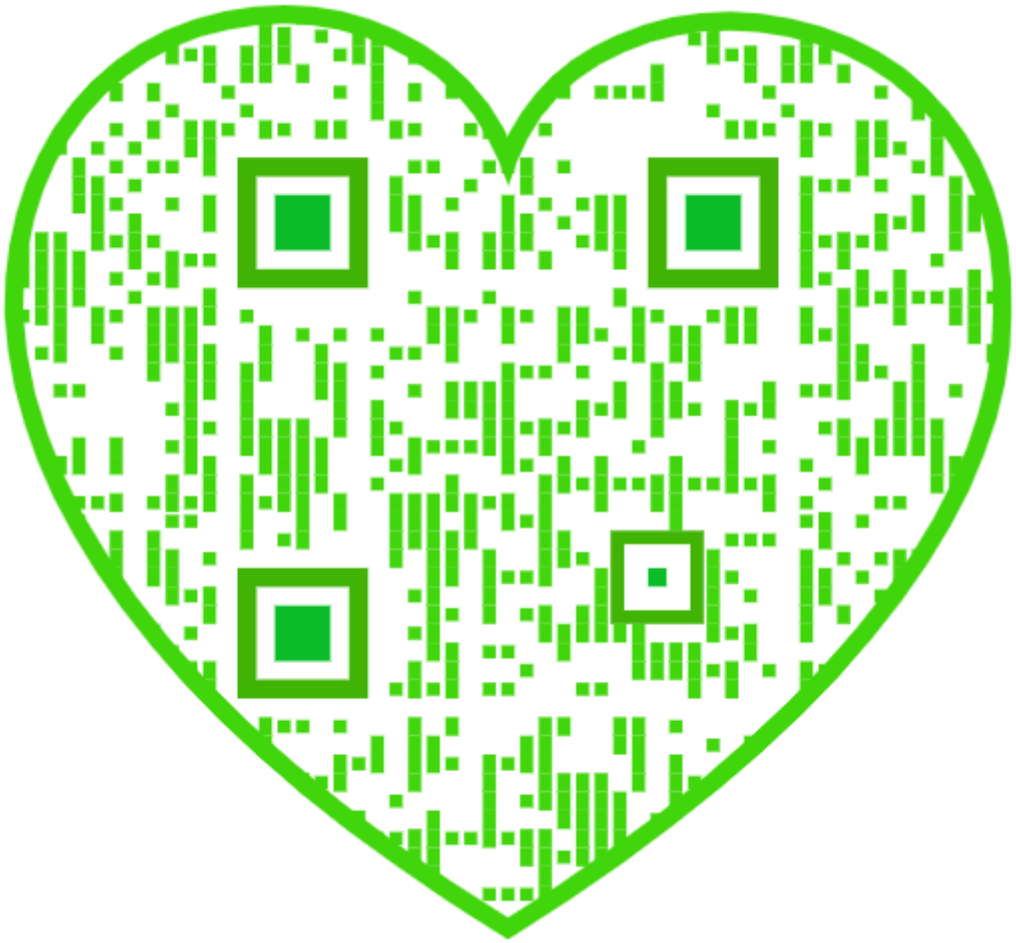

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, the 26th ult., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the chairman being Professor Cyrus Mason.

MISCELLANEOUS BUSINESS.

Water Elevators.—Mr. J. T. Rhodes exhibited a curious machine designed to raise water from a cistern. His apparatus consists of a flexible hose attached to the neck of a three-gallon tin can, the bottom of which has been removed. The can is placed bottom downward in a tin pan about four inches high. Mr. Rhodes said that, when the hose is connected with a cistern, and the hose, can and pan are filled with water, the water will rise from the cistern, and continue to overflow the pan.

Mr. Garbez remarked that this would not occur unless the pan was lower than the surface of water in the cistern. The apparatus was only a modification of the siphon, and could not act different from any other siphon; it could not discharge water at a point higher than the fountain. These were the unanimous sentiments of the members.

Mr. Rhodes (who appears to be a very truthful man) said:—"But I have tried it, and I *know* that it lifts water out of a cistern. I do not understand science; I give you the *fact*, and want you to explain it."

Gold Amalgamators.—Mr. J. N. Wykoff performed some experiments to illustrate his gold-amalgamating process. He poured a small quantity of gold sand (crushed quartz) on water in a tumbler; the gold and iron floated, while the lighter sand immediately sank. Considerable stirring did not seem to shake down the gold. Mr. Wykoff said that he had seen the gold float for a month, although it was stirred up every day.

Professor Hedrick said that chemists are well acquainted with such facts; gold precipitated by oxalic acid settles with great difficulty. To make floating precipitates sink, it is only necessary to apply heat.

Mr. Wykoff then poured about an ounce of mercury in a small test tube; upon the mercury he poured an ounce of water, and on the water a small quantity of the gold sand. He held the tube over a spirit lamp, and the mercury commenced dancing up and down through the water, as if in violent ebullition, coming in contact with the gold and carrying it down. In answer to a question he said that a thermometer in the water showed a temperature as low as 90° when the mercury commenced its movements. He supposed a film of water underlaid the mercury, became superheated, made steam, and blew up the mercury. [This theory was doubted by some of the members.] In practical operations, Mr. Wykoff used an iron pan, 3 feet by 10, and 20 inches deep, treated 150 pounds at each operation of an hour long, and obtained from gold mine tailings in Virginia from $15 to $300 per tun. The present cost to work his process is $1 per tun. Professor Hedrick and Dr. R. P. Stevens were appointed to report on the merits of the above process.

Steam Engines and Boilers.—The committee of engineers appointed to examine the merits of J. Patrick's "Variable Exhaust," and J. Montgomery's "Steam Gage," reported favorably to both inventions.

The order of discussion of the regular subject, "Zinc," being then called, Professor C. Mason resumed the reading of his paper, commenced at the last meeting. The following is the conclusion of his

REPORT.

Of five stages in the history of zinc, the first and. the last—the making of brass and the making of zinc-white (the alloy and the oxyd) directly from the ore—were the most remarkable, and perhaps the most important. The accidental discovery of brass seems to have led to the discovery of the metal. Brass had been long in use when Parcelsus produced that which he said was "a metal and not a metal, and seemed to be composed chiefly of the ashes of copper." For some reason, not apparent, he named it "zinctum."

The zinc of Europe comes chiefly from the furnaces of the Vieille Montagne Company, near Aix-la-Chapelle, in Belgium, and a large part is made into brass at Swansea, in Wales. The ores of other countries are sold in Belgium; and the quantity taken from Belgian mines is comparatively small. The ordinary price of good ore at the furnace is $17 a tun, and the coal used in its reduction costs $7 a tun; and unless new mines are discovered in Europe, the cost of producing metallic zinc must be increased. The total product of the year 1859 probably exceeds 70,000 tuns, and the new year opens with an increased demand.

The early attempts to produce metallic zinc in New Jersey failed for want of a suitable clay for retorts. But an excavation for the railroad from Easton to Philadelphia opened a supply of the very best fire-clay; and preparations are now in progress at Bethlehem, Pa., by two companies, for making metallic zinc. But these companies, and the companies in New Jersey, regard the zinc-white as a speciality peculiarly their own, in which they have a natural monopoly, because the anthracite coal is requisite to the production, and for which their own country is a sufficient field while the market of the world is open.

The two active zinc mines in our country—at Stirling Hill and at Bethlehem—are sufficiently opened to show that they can produce 50,000 tuns of zinc-white per annum. The advantages of the two vary in several particulars, but in a general average they are well balanced. The red oxyd of Stirling Hill is a strict peculiarity. The ores of Bethlehem are the sulphuret, the carbonate and the silicate of zinc. In purity, they range from 40 to 81 per cent of pure metal, and compare favorably with the workable ores of Belgium. Experience of Bethlehem show that the ore can be brought to the furnace at $2 a tun, and the coal at $1.80; with these advantages over the prices in Belgium, it is obvious that all our disadvantages, as beginners, must be overcome; and especially when our ores are reduced to zinc-white by a single process.

As to the extent of our zinc fields, it is remarkable that in Knox county, Tenn., at the southwestern end of the valley which has the mines of Bethlehem at its northwestern terminus, the zinc mines resemble those of Bethlehem; and the same metamorphic limestone which contains both of these deposits is known to predominate in the 800 miles of the intervening valley, suggesting the vast metallic treasures yet to be explored. The zinc ores of Bethlehem might have been unknown at this day had not a scientific German, employed in the Moravian school at that place, brought them to notice.

The coal for the reduction of the various ores of this long valley are deposited at convenient distances in the slopes of the same valley. But both ores and coals would have been useless had not the railroads been laid at the bottom of the valley. To open the mines is no longer an act of faith, but of discretion. The great American act of faith appeared in building the railroad. If there was a frenzy in this act of faith it was a prophetic frenzy, which the disclosures of time will show had in it a forecast of such reach and depth as could not then be comprehended; and the mad projector may say (as Bacon did) "My reputation I bequeath to future times and other nations." The railroad system has ripened the metallic harvest of the Western Continent. This harvest is destined to hasten the cultivation of the whole tropical region by the introduction of cheap machine labor; and the natural consequence will be a homogeneous continental civilization, more rich than the earth has ever known. This civilization will draw to its service all the chemical and vital forces within its reach, and so adjust its whole machinery that no spring or lever, no nerve or muscle, shall carry more than its just weight. But every new or great movement in the development and use of a metal passes through its speculative and experimental phases. Iron, copper, lead and zinc have all had their impulses and re-actions before their production and use became permanently established.

Silently but surely the zinc-white of New Jersey and Pennsylvania is pervading the markets at home and abroad. During the past year their mines yielded about 7,000 tuns, which was about 10 per cent of the white paint consumed in the United States. London is a market for a portion of the article, and the ores are profitably exported to Belgium. In 1854 white paint applied to ships and boats in the United States exceeded the total consumption of the same in Great Britain.

As a substitute for lead, the zinc-white must depend mainly on its being better and cheaper. The mere fact zinc is harmless, while the *lead* poison cuts off a quarter of a life-time in those who are employed in painting, might be expected to aid the change. It might be said, rather plausibly, that painting with lead is a cruel business—worse than building a railroad in Panama, because the thousand poisoned to death in that work provided a safe passage for travelers in all future time—worse than the sale of intoxicating drinks, because wine "maketh glad the heart of man before it biteth like a serpent." But this reasoning would be ineffectual, because the poison of the lead is invisible and operates silently. Laboring men cannot be brought to think about a tax on their earnings or their health, if it only operates indirectly and leaves them the power to "get along." If laboring men should take a turn for such thinking, they would become troublesome to the Committee of Ways and Means and to the iron-masters of Pennsylvania.

With nineteen-twentieths of the coal-field of the whole earth located within the North American continent, with the zinc mines of Europe beginning to fail and our own just coming to light, and with such a general call for the product of these mines as is advancing the price, we cannot fail to be large exporters of the cheapest and the dearest of soft metals. Zinc and gold from the North, as well as cotton and rice from the South, will swell that commerce which is giving peace to the nations and prosperity to individuals.

[We are compelled to defer publishing, until next week, the discussion which followed the above report.—EDS.

OUR SPECIAL CORRESPONDENCE.

THE "GARDEN OF THE WORLD"—THE STREETS OF ST. JOSEPH—THE PACIFIC RAILWAY—PROGRESS OF LEAVENWORTH CITY—THE MASSACRE IN MASSACHUSETTS.

LAWRENCE, Kansas, Jan. 18, 1860.

MESSRS. EDITORS:—St. Joseph, Mo., is the most western town that is in railway communication with the eastern portion of this continent. With its commercial prospects I have nothing to do; that being left to those interested in the place. It may be observed, however, that it now has a population of about 13,000, which is fast increasing; whether it will fulfill the anticipations of its friends, and progress as rapidly after the western continuation of the Hannibal and St. Joseph Railway shall have been completed, as it does now that it forms one of the termini, remains to be seen. I recently saw a map having St. Joseph for its center, with this modest heading, "The Garden of the World;" so you see that the people of St. Joseph have a just appreciation of their own merits. The town authorities are exhibiting a commendable activity in grading the streets; owing to the nature of the surface (the town site being partly on the bluffs of the Missouri river), the cuttings are quite heavy, in some places as much as 20 feet deep. In most of the present streets they have secured very fair grades, but in some of those at right angles with the river, the inclination will be as much as 1 in 10; and in a few places even steeper. In years to come, such severe grades will be much regretted, as they will prohibit the use of steam carriages, the general introduction of which will only be a matter of time. It cannot be too strongly or too constantly impressed on those having the ordering of such matters, that public works should be performed with some eye to the future, and not merely to answer in a present emergency. In this matter of grading and sewering towns, what tremendous expense has had to be incurred on more than one occasion, because the authorities of a preceding generation omitted to do these things when they could have been easily and cheaply acomplished, namely, at the first! "Whatever is worth doing at all, is worth doing *well*."

The surface of the streets of St. Joseph seem to be treated after Telford's, rather than Macadam's, plan. Next over the graded surface is laid a sort of rough pavement, and on the top of this comes the broken stone; while Mr. Macadam spreads the broken stone immediately on the earthworks, being a cheaper but less efficient method, at least as regards the amount of draft required to draw a given load over it. As a general thing, a crying evil of these broken-stone roads is that the "metalling" or ballast is not small enough; no stone should be so large as to stick in a three-inch ring in any direction—that is liberal enough, in all conscience; yet it would take a hoop of six or eight inches to pass some of the crags one often meets on turnpikes. There is a decided improvement in this essential particular in the city under consideration; the surface of its newly-coated streets would compare favorably with any I know of.

Railways are "all the talk" here, in Kansas; they are doing some little business, too. A portion of the Roseport and Marysville Railway is graded—the first line that has broken ground in Kansas; this is to run westerly from St. Joseph, and, of course, forms part of the "great national highway to the Pacific." Every line of railway, either on the ground or on paper, that has a westerly direction in this country, is to be a part of *the* Pacific Railway—at least in the estimation of its projectors. Then they have projected a line running northwards to Council Bluffs (or, perhaps, to the North Pole), and southward it is to stop somewhere this side of the Equator, at Kansas City, perhaps, there to intersect with the Pacific Railway—I mean the *real* Pacific Railway, running from St. Louis. There are several lines projected through Kansas; some 15 companies have charters at the present time, I believe. Of these, the companies whose lines united form the continuation of the Pacific Railway—along the Kansas river to the towns of Wyandotte, Lawrence, Topeka and (probably) up the Smoky-hill river—are the most important as regards the East; for this, without doubt, will be the line to the Pike's Peak gold mines, and, ultimately, to the Pacific Ocean. Through *some* portion of Kansas will be run the great railway connecting the eastern and western shores of this continent. While the extreme

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North and South are quarreling over their respective routes, Kansas is quietly pushing forward her settlements and enterprising population along the most favorable route, in such fashion as to *compel*, by the inevitable law of trade, the formation of this great highway within her bosom.

Leavenworth, the commercial capital of the territory, has experienced some reverses; property was held too high, puffed beyond its real value, and, of course, had to "come down." The citizens have had some considerable losses by fire lately. They are not properly provided with water or machinery for such emergencies. I was glad to notice that they are constructing large tanks or cisterns to hold water in case of the occurrence of other fires—an admirable plan, and one that has much assisted Cincinnati in past years. If to this they would add a couple of steam fire engines, the property-holders would be the gainers in the long run.

That frightful "Massacre of the Innocents" which has lately occurred in Lawrence, Mass., is a catastrophe sufficiently appalling to make the blood run cold in one's veins. But what other result could be looked for, when we consider the culpable manner in which buildings in some sections of this country are often put up? Years ago I wrote on this topic, calling attention to the danger that is always imminent in such cases; others have done the same, yet all apparently to no purpose. The day of prayer recommended (by the Mayor of Lawrence) to be set apart for supplication of the Most High, I regard as little better than insult and blasphemy. Men first violate, in the most reckless and criminal manner, the well-known physical laws of God; and then, because the punishment due to their infraction follows that violation, they kneel down and pray—for what? Is it that He will suspend the action of His mighty laws of gravitation and cohesion? The authorities would please God much more by *prosecuting* the criminal parties in this matter, and taking good care for the future that no such murderous, slaughter-house factories are put up in their city, than they will by the whole industrial community losing one day's labor at such a time. I believe in prayer, but more in obedience. E. M. RICHARDS.

CULTIVATION OF ZANTE CURRANTS, CORK AND RAISINS IN CALIFORNIA.

The second volume of the report of the Commissioner of Patents for 1858 is devoted to agricultural matters. We find many things in it which are very interesting, and make at this time the following extracts from a communication by Andrew W. McKee, of San Francisco:—

"To the efforts of the Agricultural Division of the Patent Office, California is indebted for the introduction of most valuable vines of the Zante grape, which produces the celebrated dried currants of commerce. These are growing and thriving exceedingly well, a most significant fact, when it is said that this variety of grape is rapidly failing, and great fears are entertained of its total loss in the country where it has hitherto been grown, the Islands of Zante, Cephalonia, &c. Should these fears be realized, and this grape reproduced and brought to its pristine quality in California, it is believed that the result to this State alone will tenfold re-imburse the entire appropriations for that Office. Six hundred and forty-three vessels annually leave the Mediterranean for the Atlantic ports, loaded with figs, lemons, oranges, limes, almonds and products of the vine, to the amount of $7,250,000, the total yield from the Mediterranean, for all countries, being over $200,000,000. It is merely a question of time, when California will supply her sister States with the above-named articles and still have more to spare.

"In connection with the subject of the products of the vine, it will at once be seen that great importance will result to California especially, as well as to Ohio, Indiana, Missouri, and all other States where the grape is manufactured into wine, from the introduction of the cork oak, by the importation of the acorn from Spain, through the Patent Office. The invoice or home cost of the cork bark imported into the United States amounts to over $250,000 annually, with a greatly increasing demand. This tree is found to grow and thrive remarkably well wherever planted in our middle and southern States, as well as those on the Pacific coast. It grows rapidly, and attains a hight of over 30 feet. The Patent Office has already imported enough acorns to plant more than half a million trees.

In Lower California, where labor is cheaper and the distance from market too great for the sale of fresh fruit, most excellent raisins are made from the large Malaga grape, and thus, with the California grape, we may expect, ere long, to have plenty of excellent raisins manufactured in our interior valleys. Certain it is, that our grapes lack nothing in richness of flavor nor abundance of saccharine qualities to adapt them to such a purpose.

"The cultivation of the grape in California is exceedingly simple, and attended with the most astonishing profits. The soil, as a general thing, is a rich sandy loam, which is plowed, harrowed and stricken off into rows six feet each way. Some put them seven feet asunder. A crow-bar is used to make the hole, and the cutting is inserted about three feet deep, leaving from four to six inches above the surface. In two years the vines begin to bear, and abundantly, in from three to five. At what age they reach their maximum yield is uncertain; but the records of the Missions and living witnesses prove, beyond a doubt, that there are vineyards in this State from 60 to 70 years old, which are yielding as largely as ever before; nor within the period of 70 years has there been even a partial failure, although, within that time, the wine crops throughout Europe and other countries have been terribly afflicted, and entire annihilation threatened.

"The ordinary calculation is that an acre of land in California is sufficient for a thousand vines, each of which, when in full bearing, will produce a gallon of wine. This is proven to be a safe estimate, but rather under than over the average. An experienced man, with the assistance of a horse and plow, for about eight days in the year, will attend and cultivate from eight to ten acres. The vines are generally pruned close, but not trained. In this manner the yield is more abundant, the grapes sweeter, and produced more cheaply, there being no cost for staking or trellising. The closer the bunches can be raised to the earth in California, where it never rains during the summer months, the more benefit they receive from the radiation of caloric. Thousands of vines and cuttings have been sent from California to the eastern States. Mr. N. Longworth, of Cincinnati, speaks of them as doing well in Ohio. A quantity has also been planted near Lebanon, Tenn., in the open air, and is reported as doing well; and it is believed that, if a similar method of culture, with a little care in winter, were tried in Maryland, Virginia, North Carolina, Kentucky, and other States adjacent, this grape would prove highly profitable. As to the future prospect for the grape-culture in California, it is ascertained beyond a doubt that there are now in full bearing two million vines matured, two million about two years old, and preparations are being made this year to put out at least three million more. The increase of vines from 1856 to 1858, only two years, has been more than doubled. The value of the grape crop in this State, for 1858, is estimated at $1,000,000. When the present stock of vines is well matured, it is estimated that their yield will be worth nearly $8,000,000.

"Although there is not a county in this State, from Oregon to Mexico, where the grape will not flourish well, it is conceded that the three southern counties, Los Angeles, San Bernardino and San Diego, which are about on an equality wherever localities are found susceptible of irrigation, bear off the palm for quality and quantity per acre; and it is fully ascertained that the capabilities of these counties for the vine, with the present supply of water for irrigation, are equal to one hundred million vines, equivalent to 100,000,000 gallons of wine."

SEWING BY ARTIFICIAL LIGHT.

MESSRS. EDITORS:—Persons whose vision is somewhat defective can sew white cloth by candle-light, but they are unable to perform the same operation with black cloth. The following plan, however, affords a partial remedy:—Pin or baste a strip of white paper on the seam of the black cloth to be operated upon, then sew through the paper and cloth, and when the seam is completed the paper may be torn off. The black thread will be distinctly seen on the white paper, and by drawing the stitches a little tighter than usual, good work will be produced. This method is well adapted for sewing by machinery as well as by hand.

M. M.

HORSE-POWER OF BOILERS

We will give some rules by which any person may be able to ascertain the horse-power of a steam boiler. We do this in answer to several correspondents who have recently sought information on this point.

Without artificial draft, for stationary boilers, 1 square foot of grate and 9 square feet of heating surface, is called a horse-power. The 9 square feet of heating surface mean half the area of the tubes or the flues, half the area of the vertical sides of the fire-box (when surrounded with water), and the whole of the crown plate. Question: what is the horse-power of a boiler having 9 square feet of grate area, with the two sides of the fire-box 2 feet deep to the crown plate, and 20 3-inch tubes, 10 feet in length? Answer: efficient fire-box surface, 15 feet; tube surface, 117.6.10; therefore $15+117.6.10\div 9=14.7$ horse-power. Of course all rules for estimating the horse-power of boilers are conditional. It is simply considered that a boiler which has a clear burning fire, 1 square foot of grate and 9 square feet of effective heating surface, is called a horse-power. The efficiency and evaporative power of any boiler depend on several circumstances. One with 100 square feet of grate and 1,000 of heating surface, if it has not sufficient draft, may not be able to generate steam to drive a donkey engine of 5 horse-power. With high chimneys boilers have done well with half a foot of grate surface per horse-power. The foregoing rule is applicable to both cylinder and tubular stationary boilers, and has no reference to the economy of the one or the other. With a good draft the fire-box surface is most efficient in generating steam rapidly, but the fuel is economized almost in proportion to the extent of the heating surface. Upon this subject Clarke says, in reference to locomotive boilers "It is fairly deducible from 200 distinct trips, with 27 engines, on the Great Western Railway (England), that an increase of heating surface from 40 to 84 times the grate area, with a rate of evaporation of about 11 feet per hour, per foot of grate, was attended with a substantial increase of the evaporative efficiency of the fuel (coke), represented by a rise from $6\frac{7}{8}$ to $8\frac{3}{8}$ pounds of water for 1 of fuel." The evaporation of a cubic foot of water per hour in a boiler is equivalent to a horse-power. Some locomotives have evaporated 22 cubic feet of water per hour per square foot of fire-grate. It will be found economical to have about 60 times the heating surface to 1 of the grate; that is, calling the whole surface of the tubes and flues heating. Bridge walls and diving flues are very essential for economizing fuel, by keeping the heated products of combustion longer in contact with the metal, through which the heat passes to the water. Experiments with American boilers, both marine and locomotive (the latter belonging to steam fire-engines) are favorable to the superior efficiency of vertical tubes. No steam is generated from the lower surfaces of horizontal tubes, while in the vertical tubes there is a constant current which permits the steam to escape upwards more freely from the heated surfaces. This accounts for their more rapid generation of steam.

GOV. BLACKSNAKE.—This noble and venerable old Indian has gone to his long home. He died about the first of the present month, aged 123 years! This relic of bygone generations retained his powerful mind and energies vigorously to the last. He was born in 1736, and was four years the junior of Washington. He was 37 years of age when the tea was thrown into Boston harbor; he was a warrior in the vigor of manhood in the old French war in the years 1755-6 and 7. Gov. Blacksnake was a great friend of, and intimate with Washington, and received and faithfully kept a medal given him by the latter. He was a very strong and athletic Indian, and has actually traveled on foot to Buffalo and returned, between the rising and setting of the sun, which by the old Indian trail was 110 miles—time, twelve and a half hours. When he was 90 years of age, he was as erect and noble, his step as firm and elastic as a youth at 20. He died at his residence near Cold Spring. He was buried after the customs of his people, in a sitting posture, with his hunting implements around him, amid the lamentations of the fading relics of his race that still linger along the shores of the Alleghany. Alas!—

"Chieftains and their tribes have perished,
Like the thickets where they grew."

FROM recently published data, it seems that in Lima, Peru, there are 45 shocks of earthquakes a year. Agitation is "the order of the day" there.

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LIFE-SAVING AGENCIES FOR SHIPPING.

We are now a great commercial people; our flag floats on every sea, and we have the largest commercial navy in the world, with the exception of Great Britain. The dangers of a sea-faring life are well-known, and these are more numerous and imminent according to the extent of our coast line. It is not only humane, but it is the most wise and just policy which can be pursued, to provide the most efficient means not only to prevent shipwrecks, but also to mitigate the calamities which follow when these take place. We have done much to effect these objects, but not a tithe of what we ought to have done. Disastrous storms frequently visit our coasts, and many noble ships, long absent from home, are driven on shore, and their entire crews swept into a watery grave within sight of their native shores. What have we done to save the lives of shipwrecked persons on our coast?

At a late meeting of the Philadelphia Board of Trade, a report was read by a special committee, appointed for the purpose, on this subject; and copies of it were directed to be transmitted to the New York Chamber of Commerce, the Board of Marine Underwriters of New York, and the New York Life-saving and Benevolent Association, and other societies in Boston, Baltimore, and other cities, asking their assistance in urging upon Congress an appropriation of $50,000 and some effective legislation upon the subject. The report states that, on the 9th of October, 1859, on account of dissatisfaction expressed in regard to the operation of the metallic boat (alleged to be too heavy, and liable to puncture), the Secretary of the Treasury appointed three commissioners to determine upon that form of boat which was best adapted to saving life in case of shipwreck on the coast, who accordingly made choice of the most approved patterns; and though 54 boats have since been distributed on Long Island and New Jersey, they are not of the character thus recommended, and are "declared to be of inferior workmanship and of no value as life-boats." It is also stated that neither the mortars nor their accompaniments at the life-boat stations are efficient; and that the keepers and crews are not drilled to execute their duties. Francis' metallic life-cars have been supplied to the stations; they are valuable acquisitions, but their availability depends upon communication being established by a hawser between the shore and the wrecked vessel; and if the mortars and rockets are not well managed, their objects may be entirely defeated.

The best boats and other apparatus for cases of shipwreck should be furnished to all stations on our whole coast, and for accomplishing such objects more effectively, we may refer our readers for some very excellent information on the subject to the operation of the Royal Life-boat Institution of England, which was described in the last number of the *North British Review*, in a very able article by Sir David Brewster. This institution was founded by private subscription; and in the year 1854, there were no less than 89 of these boats under its management. The practice of the institution is to assist local associations in maintaining boat-stations, the sum required for each being about $2,000; but at least one-third of this amount is expected to be raised in the locality. Since 1824, the institution has awarded 81 gold and 629 silver medals for distinguished services, besides pecuniary rewards amounting to £11,651 (about $58,000). Last year there were, at the several stations in England, 115 life-boats; Scotland, 7; Ireland, 14; total, 136. Beside these, there were 216 mortar and rocket stations. The boats are self-righting, being supplied with heavy iron keels and air-cases at the sides, and will carry 30 persons besides the crew. In consequence of the upsetting of some of the best British life-boats in very tempestuous seas, it became a matter of necessity to supply the crews with *life-belts*. Those used were lately invented by Capt. Ward, R. N.; each consists of two rows of narrow pieces of cork, each sewn separately to a strong linen duck belt, which covers the body from the arm-pits to the hips, and is tied round the waist by one set of strings; while another set passes over the shoulder, like braces. The buoyant power of such a belt is 24 lbs.; and 800 of them have been distributed among the life-boat crews. From 1824 up to 1359, the number of 10,902 shipwrecked persons have been saved by this institution. It cannot be expected that such a system as that which prevails in England can be carried out in the United States, because our population is so thinly distributed along the sea-coast; but we have here an object for imitation, besides carrying out the suggestions of the Philadelphia Board of Trade in seeking government appropriations, namely, voluntary contributions by those wealthy merchants who are so much indebted to our seamen for their fortunes and trade.

CITY NUISANCES—REFORMS REQUIRED.

The following are extracts from the recent report of Mr. Delavan, our city inspector, and they are well worthy of general attention, as the nuisances of which he complains, and the reforms which he recommends, have been suggested and advocated long ago in our columns. All the hints given are applicable to most of our cities:—

STREET CLEANING.

The report states that it is highly necessary that the work of cleaning streets should be performed at night, and completed before 6 A. M. in the summer and 7 P. M. in the winter, Objections to the present system are the fact that the sweepers and carts incommode the travel of the streets, the clouds of dust raised by them injure the goods of storekeepers and the health of those who breathe the particles. The custom of watering the streets before sweeping is complained of by the medical faculty as injurious to public health. The effect of water upon decaying matter, especially during the heat of summer, is to produce decomposition and to create miasma. The night system, it is said, would remedy this evil.

RAIL CAR VENTILATION.

The want of proper ventilation in the rail cars of this city has become a subject of great importance. It is not uncommon for some of the cars to take in invalids who may be on the way to some hospital, without regard to the health of the other passengers. From thirty to forty persons are crowded into the vehicles, the doors are closed, and no escape is allowed to the foul air thus generated. All complaints upon the subject are unavailing to the managers, to whom gain is everything—the public health and convenience nothing.

TENEMENT BUILDINGS.

The extent of misery, filth, destitution and disease which are everywhere met with among the tenement buildings of this city, cannot be described. Many of these dwellings contain from thirty to forty families. In a recent visit to one of these houses, in a room about six feet wide and seven feet high, without light or ventilation other than came from the door, was a family of six persons—two adults and four children. In these miserable habitations, where thousands of the poorer classes of our population are to be found, the children sicken, pine away and die to an extent wholly unappreciated by the public. This evil cannot be done away until the erection of dwellings for the poor is compelled in accordance with the laws of health and life.

SWILL MILK.

"Humanity (remarks Mr. Delavan) calls for the immediate and unconditional abolition of every swill milk establishment. Of the 21,645 deaths during the past year, 12,948 were of children, and a large majority are traceable, directly or indirectly, to the use of swill milk." The inspector characterizes these as human slaughter-house establishments. He quotes at length the opinion of the Academy, and an elaborate report of Dr. Reese on infant mortality, and recommends the prohibition, by ordinance, with severe penalties, the introduction and sale of this pernicious article from adjoining cities and villages.

CESSPOOLS.

The imperfect construction of cesspools is cause of numerous complaints. Old wells and cisterns with imperfect openings, are often converted into receivers of waste and service water. These soon become choked up, and the contents remain to stagnate. Sometimes these connect with the privy, which in turn overflows, or breaks into basements and cellars, generating disease. In all cases were cesspools are required they should be drained by connection with the sewer.

BELGIAN PAVEMENTS.

Much difficulty attends cleaning streets which are paved with cobble stone. Besides, this pavement is wholly unsuited to the wants, if not the actual necessities, of the city, and should be at once superseded by the Belgian. Both on the score of economy and the public health this change is recommended.

MORTALITY.

The number of deaths which occurred in this city last year was 21,645, which is 688 less than in 1858, although there has been a large accession of population by births and immigration.

DISCOREA BATATAS IN ENGLAND.

A paper has recently been published in the *Irish Agricultural Review*, by Professor Buckman, of the Royal Agricultural College, Cirencester, England, giving his experience with this Chinese yam in England. As it formed a subject of considerable notoriety in our own country about three years ago, the information we are about to give respecting it (condensed from our cotemporary) will be of interest to our farmers.

This plant was introduced into England some years ago, with the avowed object of supplying the place of the potato, and at a time when the extinction of the latter appeared very probable. The *discorea batatas* belongs to an order of plants quite distinct from the potato. The method of cultivation adopted for it, at the garden of the Royal Agricultural College, was by deep digging first; then the ground was laid out in high ridges, and treated with the best barn-yard manure. From one cutting planted in the deeply-cultivated and highly-fertilized soil, one poor yam was grown, which was one foot eight inches long, four inches thick at the greatest girt, and it weighed only eight ounces; it was mostly all spindle. The following are the conclusions of Professor Buckman in regard to its cultivation:—"1st. The deep digging is necessitated for a plant which has a direct downward growth of from 18 inches to more than 2 feet; this, then, requires a deeper soil than is usually found to rest upon, at least, the calcareous rocks. The preparation for this crop, then, is more expensive than for any other, and as labor of this kind cannot be done with the plow, this fact alone would militate against its taking the place of the potato in field cultivation. 2nd. This curiously deep growth involves immense labor in getting-up the crop, in our own experiments, certainly more than the result is worth. 3rd. The shortness of our summer for root heat—without which this plant makes but very slow progress—will ever prevent the potato yam from being successfully grown in this country, unless in a few favored spots. 4th. The peculiar growth of the bine or flexible stems, like its cognomen, the black briory, points to the necessity of some support, in order that the leaves or plant lung may be fully developed, without which little root can be expected. 5th. Under the ordinary circumstances of soil and climate of the British Isles, I cannot imagine that its yield will be sufficient, or its flavor so surpassing, as to entitle it to a much higher place than such old garden esculents as *schorzonera*, salsafy; or especially the common artichoke, which, indeed, is not unlike the potato yam in this particular, but with a far greater power of fecundity, and much more easy of cultivation."

These remarks, then, point to the general conclusion that the potato yam can never be relied on, to greatly aid the common potato in supplying a vegetable food for the mass of the people; still less can it ever supply the place of, or supersede the widely-spread, easily-cultivated potato.

AGRICULTURE AT YALE COLLEGE.—To see Yale College stepping out from among the mists of antiquity and the graves of dead languages, and "taking up the shovel and the hoe," is certainly one of the signs of the times. She made her *debut* on this new stage on the 1st day of February, having secured the services of 25 leading agriculturists to sustain her in this first effort. These gentlemen are to take up all possible subjects connected with agriculture for the benefit of farmers and gardeners, young and old, and for their own material enlightenment. There are to be three lectures a day for the space of a month, each lecture to be followed by questions and a discussion. The list of names, in which we find Marshall P. Wilder, late president of the National Agricultural Society, Cassius M. Clay, of Kentucky, Lewis F. Allen Esq., of New York, and other eminent men, beside Professors Silliman, Porter and Johnson, of Yale College, give the highest character to the undertaking. The advantages of this course are offered so cheaply ($10 for a course ticket) that it will draw together large numbers. The idea involved in this enterprise, namely, getting together educational capital by small contributions of knowledge from large numbers, is an important discovery. We do not see why it is not susceptible of very extensive and varied application.

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LUCIFER MATCHES.

The remotest antiquity appears to have been in possession of means to light a fire, and although history records some nations unacquainted with the nature of fire, no people, however savage, can now be found, who do not obtain and use it in some way. That of the ancients was produced by such physical agents as friction, mirrors or solar specula. How long these rude means remained in use, and in what modifications, does not interest us at present, since we intend principally to trace back the history of *lucifers* ("light-bearers") to the point where the old tinder-box went out of use on the greater part of the face of the civilized world.

The principle on which matches are now made was applied, we think, half a century ago in France. It is simply to bring such substances as are rich in oxygen and will part with it readily, into contact with such as are very inflammable, and to induce the combustion or oxydation of the latter either by friction or by heat produced by some means. The first real and practical application of this principle was made with chlorate of potassa. Berthollet, the discoverer of this salt, found that when mixed with inflammable substances it causes their combustion in consequence of the facility with which it parts with its oxygen whenever such a mixture is rubbed between two hard bodies or moistened with concentrated oil of vitriol. It was about fifty years ago that experiments were made tending to replace the saltpeter of gunpowder by chlorate of potassa; but the danger attending the preparation of the mixture and the number of accidents resulting from the so-called muriatic powder prevented its adoption. When chlorate of potassa is mixed with sugar, starch and sulphureted metals, such as vermillion, crude antimony, and others, on being touched with oil of vitriol the mixture will burn up immediately. Parkes, in the third edition of his "Chemical Catechism" (1808) speaks of this mixture as a means to light a fire with. Not long after, this suggestion was made use of by covering the common sulphur-matches (which the next generation will have to hunt for in remote corners of the globe) with a mixture of chlorate of potassa and sugar. Thus prepared the matches were lighted by being dipped in a little bottle containing asbestos moistened with oil of vitriol. The chloric mixture being lighted by contact with the sulphuric acid set fire to the sulphur and this again to the wood. According to Warren de la Rue this is a French invention, which is not unlikely, though the manufacture on this principle upon a large scale was first carried on in Tuebingen, a university town in Wirtemberg. The mixture used in this place was composed of chlorate of potassa, sulphur, gum arabic and vermillion, the latter merely as coloring. These *chemical* matches certainly answered the purpose of rapidly furnishing fire and light, but carried with them various disadvantages. In the moment of being lit they diffused a very disagreeable smell; at times a portion of the combustible mass and the oil of vitriol was thrown about in consequence of the rapid ignition; and the oil of vitriol, owing to its peculiarity of condensing moisture from the air, when the bottle was not securely stoppered, became weaker and lost its lighting property. Nevertheless these matches came very largely into use. Up to the year 1832 no other kind was known, although divers makers varied the composition by substituting lycopodium (vegetable brimstone) for sulphur, and red lead for vermillion, and also varying the relative proportion of the ingredients. The necessity of using sulphuric acid, however, the facility with which the latter lost its action by exposure to the air, and the then comparatively high price of the chemical match combined, stood in the way of their general introduction and flint and steel still reigned supreme.

About the year 1832 the friction or Congreve matches first made their appearance. The match itself was prepared with sulphur and then covered with a paste formed of chlorate of potassa, black antimony and mucilage of gum. It was lighted by drawing it rapidly between two pieces of sand paper held folded between the fingers. Here disadvantage showed itself that in consequence of strong pressure the inflammable portion came off and the match was rendered useless. But though very imperfect and of limited application in this shape, the principle was found to be excellent. The crude antimony (tersulphide) required too high a temperature to be ignited by the chlorate of potassa and consequently too strong a friction, and a more inflammable substitute was demanded, which was soon found in *phosphorus*. The discovery of phosphorus-matches dates from 1833, in which year Romer and Preshel, two large manufacturers of chemical matches, commenced to make them on a large scale at Vienna, Austria.

At first the mixture used for these matches contained a certain portion of chlorate of potassa, an addition which in some places is still made. Its inflammable properties are very great, so much so as to resemble an explosion on a small scale. As may be imagined the danger attending the manufacture was thus greatly increased and exemplified by various misfortunes, which caused their prohibition in a number of European countries. Various means were tried to remedy these drawbacks, and the experience of Preshel at last enabled him to dispense with the use of chlorate of potassa, as well as with that of sulphur. The substitute for the latter he found in stearine, that for the former in brown oxyd of lead. The common matches now-a-days are dipped, as formerly, first in melted sulphur and afterwards in a paste formed by phosphorus, glue or gum, water, fine sand and some coloring matter such as burnt ocher, red-lead, vermillion, ultramarine, &c. But the so-called "Vienna" or fancy matches, which are now coming more largely into use on account of their rapid ignition, producing no odor or explosion, and which completely withstand atmospheric moisture, have for a base a mixture of phosphorus and bin-oxyd of lead, which is applied to round sticks previously dipped in melted stearine, and is covered by some colored varnish. What has hitherto prevented these Vienna matches, although they are favorites wherever in use, from supplanting all others, was the high price of bin-oxyd of lead. This preparation the manufacturer is usually obliged to make himself from red lead, which contains about fifteen per cent, and from which it is obtained by treating it with strong nitric acid. It will therefore be good news to all who now obtain their light under difficulties, and to match manufacturers who have been unable to compete with the imported matches on account of their quality and price, to learn that bin-oxyd of lead, chemically pure and of the most subtile fineness, is made by a method which renders it unnecessary for the match manufacturers to prepare it by an unwholesome and expensive process.

F. F. MAYER, Practical Chemist.

New York, Feb. 4, 1860.

BOILER INCRUSTATIONS.

MESSRS. EDITORS:—In the columns of your paper, I sometimes notice articles on the removal of incrustations from boilers; and among other substances, hemlock bark is mentioned. Now, my experience has taught me that hemlock bark is an injury in many instances instead of a remedy, for the reason that it lies at the bottom of the boiler, gathers the dust there, and prevents the water from touching that part, which is consequently liable to be burned. Some engineers use potash: that I consider worse than hemlock bark, for the reason that it is injurious to the material of the boiler itself. I will give you a remedy that I have seen used for 20 years with complete success, which keeps the boiler perfectly smooth and free of all scales. The remedy is: clean your boiler every six weeks, and for a common-sized boiler, put in one peck of rye. The establishment that use this remedy have hard water in their boilers.

M. N. W.

Alleghany City, Pa., Feb. 4, 1860.

UNDERGROUND DITCHES.

MESSRS. EDITORS:—I am now using one of the underground or mole ditches with great success and satisfaction, but still labor under some great difficulties. First, it is difficult to take up and put in stakes; and, second, it requires from two to three extra teams to draw the capstan over the ground, and is particularly troublesome upon plowed ground. These extra teams are only needed to remove the capstan, and therefore stand idle a greater part of the time. I would ask you, gentlemen, through the columns of the SCIENTIFIC AMERICAN, whether any machine has ever been got up or patented by which a portion of this labor may be overcome; if so, it would be of great advantage to me to have such a labor-saving and expense-saving machine.

F. A. W.

West Haverford, Pa., Feb. 4, 1860.

ALLEGED YANKEE SWINDLES.

In the first number of this present volume, we published an article headed "The New Yankee Swindle," which we transcribed from an English journal. We expressed a doubt as to whether such rascality really had been perpetrated in America, and ventured to say that, if such things had actually occurred, it was more than probable that the alleged Yankee delinquents had received their birth, parentage and education somewhere in England. We are indebted to a correspondent in Abbeville, S. C., for some further elucidation of this subject; and a doubt no longer exists in our mind as to the fact that such swindling has existed. A recent number of the *English Churchman* (published in London) gives a long account of a series of begging-letters which were said to be the offspring of "an American begging-letter writer," and which, for a time, proved successful to the infamous schemers. The Edgefield (S. C.) *Advertiser* also affords a confirmation of the above charge, and states, in effect, as follows:—"An English gentleman dies and leaves a widow without children; the announcement of his death is read by some swindler in this country, who indites a letter in the most pathetic language, signed by an imaginary outcast—'Mary E. Bruce'—and supplicating aid from the deceased for herself and *his boy*. The sorrowing widow in England, unwilling that a slur should be cast on her departed husband's name, complies with the request, and remits the sum named by the impostor. Mr. A. Ramsay, postmaster at Edgefield, S. C., has already received two registered letters addressed to 'Mary E. Bruce,' which he has forwarded (by request) to the care of Dr. Raymond, Yorkville, N. Y. This swindle is only a type of many similar frauds which have recently been effected."

These swindles are the natural result of the law of primogeniture. A family of boys are reared in idleness and luxury; all the property is given to the oldest, and the others turned upon the world to shift for themselves, scattered abroad in all lands, without habits of industry or self-denial; it is no wonder that their brains are constantly teeming with schemes for getting money without working for it. We hope to see the conscience of the *Churchman* aroused to advocate the repeal of this unnatural and wicked law; and when it has set its hand to the plow, let it not look back, but press forward and urge that other great twin-reform which the future is destined to see wrought in the institutions of England—the *separation of Church and State*.

$37,500 SAVED TO INVENTORS IN ONE YEAR.

During the past year we have made, through the agency of our efficient Branch Office at Washington, about 1,500 preliminary examinations of alleged new inventions. Of this number, nearly one-half (750) have been reported upon unfavorably, and the inventors advised not to expend money in prosecuting applications for patents. If we had advised each of these 750 inventors to apply for patents, they would, in all probability, have paid on an average the sum of $50 each; thus, by availing themselves of the facilities we offer, they have saved, in the aggregate, the sum of $37,500 in one year. We have an efficient corps of Examiners connected with our Washington office, whose duty is to examine the descriptions or models of inventions we submit to them, and then compare them with any and all inventions in the Patent Office relating to the same class, and carefully report the prospects of success of an application for a patent. We do not wish to be understood that a pre-examination will, in all cases, actually settle beforehand the patentability of an invention beyond question; we wish not to make such an impression upon our patrons. No system committed to human hands can be made to work perfectly; but we confidently recommend inventors to embrace this easy and cheap method of having their supposed inventions examined before they incur the expense of an application. It affords general protection, and is usually reliable. Upon being furnished with a plain sketch and description of an invention, and a fee of $5, we cause a thorough search to be made, and a report of the result drawn up. All communications are considered confidential, and should be addressed to our office in New York.

AMERICAN files cut by machinery at Ballard Vale, Mass., are coming into use among machinists, and are reported to be equal in quality to those made by hand.

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THE IMPERIAL STABLES AT PARIS.

We translate from a Parisian journal the following curious and interesting description of the new stables just erected for the splendid stud of the Emperor of France; leaving our readers to apply a fitting moral to such imperial extravagance.

The buildings have the form of an oblong square, divided into two courts, one called the Cour Caulaincourt, and the other the Cour Visconti. The two sides run parallel to the river. On the left of the Cour Caulaincourt is the first stable, divided into fourteen stalls for saddle horses. Adjoining, is a second which contains ten boxes, and a place for washing. The architectural character and decoration correspond with that of the other parts of the building, and the ornamentation is in the Italian style. From the ceiling are suspended gas lamps, and cocks supply the quantity of water required for use. The interest attached to these stables is increased by the celebrity of their inmates. One of the horses is "Buckingham," which the Emperor rode at Magenta; another "Ajax," which was his charger at Solferino. There are also "Percival," "Hamilton," and "Ploughboy," the Emperor's favorite hunters. "Cunningham," has also its stall there. It was this horse which the Emperor gave to the King of Sardinia, and which, at the end of the war, was returned to his Majesty; the King of Sardinia saying that he could not find any valuable present to make. The gallery into which the visitor enters after passing the washing-place is 300 feet long by 14 wide. It has a row of stalls on either side, and accommodates 82 horses. When lighted up with gas at night the effect is exceedingly striking. Among the horses is the fine carriage one "Orphee," who has survived the fourteen wounds it received before the Opera-house in January 1858, when its companion was killed. The ground floor of the two other sides of the parellelogram is fitted up as coach-houses, harness-rooms, and other offices. In the coach-house on the east side, in the Cour Visconti, are 12 ordinary state carriages, and on the west side 50 of different kinds. Over these ground floors are apartments for the grooms, postilions, stable-boys and other persons connected with the department. All the carriages are very handsome, but the most elegant is the grand state one, which is magnificent. The body is almost entirely composed of the finest plate glass; it is lined with rich white satin covered with gold bees, and the straps and cords are in gold lace. The border round the roof of the carriage is in bronze finely chased and richly gilt, and forms ciphers and crowns mixed with laurel and oak leaves; a gilt eagle is at each corner. The wheels and every other part of the carriage are of equal magnificence and in perfect keeping with the body. This carriage cost 90,000fr. One still more magnificent than the above is at Trianon, and was used by the Emperor at his marriage. It was used at the coronation of Charles X, and the repairs alone cost 300,000fr. This carriage is completely gilt in every part. On the panels of the door are the arms of the dynasty surmounted by the crown, surrounded by the Cordon of the Legion of Honor. The other panels are ornamented with symbolical figures. The paintings were all executed by Isabey. The total weight of this carriage exceeds 6,500 kilogrammes. The service of the royal stables was always considered as one of great importance under the old monarchies, and required much technical aptitude and knowledge. General Fleury, who is now at the head of this department, was selected from this circumstance by the Emperor. The imperial stud altogether is composed of from 300 to 320 horses—saddle, carriage and post-horses; and they are now distributed in five different establishments—at the Louvre, the Tuileries, the Rue Montaigne, Rue de Monceaux and Saint Cloud. The active service is at the Louvre and the private one at the Tuileries. At the Rue Montaigne are the saddle horses of the Emperor, as well as a number of carriage horses. Saddle and carriage horses are also kept in the Rue Monceaux, and the infirmary is also established there. At Saint Cloud 60 horses for different purposes are always kept. The horses when required to be turned out to grass are sent to Meudon; the breeding stud is at Villeneuve-l'Etang. The saddle horses are all English, and those for carriages English and Norman, and the posting-horses are Norman. The carriages, 180 in number, are kept at the Louvre, the Tuileries, and in the Rue Montaigne. The State carriages are at Trianon. The new stables which are to be built on the Quai d'Orsay, facing the Pont d'Alma, will be capable of receiving 300 horses, and will contain those of the Empress, the Prince Imperial, and the reserve of his Majesty. The stables of the Louvre, which were begun by M. Visconti, were completed by M. Lefeul. The number of men employed as coachmen, grooms, &c., exceeds 300. The most perfect order and strictly military precision prevail in every part.

THE MINERAL WEALTH OF GREAT BRITAIN FOR 1858.

We are happy, says the London *Mining Journal*, in being able to present an accurate return of the metalliferous and mineralogical wealth of the United Kingdom for 1858—the usual annual statistics compiled by Mr. Robert Hunt, F. G. S., being now completed. The return is remarkably favorable as compared with the preceding year; the value of the metals, metalliferous minerals and coals being thirty-one millions and a quarter in 1858, against twenty-five millions in 1857. Subjoined is the general summary of mineral productions:—

Minerals.	Tuns.	Value.
Tin	10,618	£671,057
Copper	226,852	1,336,535
Lead	95,855	1,370,726
Zinc	11.556	36,199
Pyrites	100,263	77,123
Arsenic	555	860
Nickel	4	188
Urnium	—	21
Manganese	1,400	2,800
Gossan, &c.	—	1,231
Iron ore	8,040,959	2,570,701
Coal	65,008,649	16,252,162
Total value of minerals		£22,319,593
Metals.		
Tin	tuns 6,920	£823,480
Copper	14,456	1,562,693
Lead	63,303	1,489,005
Silver	ounces 569,345	156,569
Zinc	tuns 6,900	174,225
Iron	3,456,064	10,713,793
Total value of metals obtained from British ores		£14,919.770
Estimated market value of other minerals and metals		95,000
Coal		16,212,162
Total value of metals, metalliferous minerals and coal produced in 1858		£31,226,932

LARGE STEEL FIRE BELL FOR SAN FRANCISCO.

A number of ladies and gentlemen assembled recently at the works of Messrs. Naylor, Vickers & Co., Millsands, Sheffield, to witness the casting of the largest steel bell—which was, we believe, also the largest casting in steel—ever produced in this country. Fenced stages had been erected for the accommodation of the spectators in situations commanding a good view of the operations. A large iron vessel, plugged at the bottom, was placed in the pit, above the mold, to act as a funnel, and the molten steel was poured into it from the crucibles. The emptying of the crucibles (105, containing 56 lbs. each) into the funnel excited much interest, requiring a great amount of skill, care, and nerve. The men had all been told off into companies, each man having an assigned post and a fixed portion of the work. The carrying and emptying of the crucibles is a painful and difficult task, but it was performed with the utmost order and celerity; the whole of the crucibles being brought up from the furnaces and emptied in the brief space of six minutes. The moment that part of the process was finished the plug was drawn from the bottom of the funnel by means of a crane. The fiery liquid then ran into the mold in a copious and uninterrupted stream, and the casting was complete. When the metal was sufficiently cooled to permit of an examination, it was found that the huge casting was perfectly sound. The weight of the casting is 2 tuns 12 cwt., or 5,624 lbs., and the dimensions are:—Hight, 5 feet 3 inches; diameter at the mouth, 6 feet 2 inches; thickness at the sound bow (where the clapper strikes), 4¼ inches. Messrs. Naylor, Vickers & Co. have but recently added the casting of bells to the other branches of their trade in steel. They cast their first bell in 1855, and have since turned out no less than 1,300. A large expansion of the trade is anticipated from the fact that steel is considerably cheaper than "bell metal," and, being also stronger, a much smaller weight suffices for any required result, thus making the difference between the price of the two kinds of bells even greater than is represented by the difference in the cost of material per weight.

The order for the large bell is from Messrs. Conroy & O'Connor, of San Francisco, and it is to be used as a fire alarm-bell in that city.—*Illustrated London News.*

The Splendor of Damascus.—Damascus is the oldest city in the world. Tyre and Sidon have crumbled on the shore; Balbec is a ruin; Palmyra is buried in the sands of the desert; Nineveh and Babylon have disappeared from the Tigris and Euphrates; Damascus remains what it was before the days of Abraham—a center of trade and travel—an island of verdure in a desert—"a predestined capital," with martial and sacred associations extending through more than thirty centuries. It was "near Damascus" that Saul of Tarsus saw the "light from heaven, above the brightness of the sun;" the street which is called Strait, in which it was said "he prayeth," still runs through the city. The caravan comes and goes as it did three thousand years ago; there are still the sheik, the ass, and the water-wheel; the merchant of the Euphrates and of the Mediterranean still "occupy" these "with the multitudes of their waters." The city which Mahomet surveyed from a neighboring hight and was afraid to enter (because it was given to have but one paradise, and for his part he was resolved not to have it in this world,) is to this day what Julian called "the eye of the East," as it was, in the time of Isaiah, "the head of Syria." From Damascus came the damson, or damascene, our blue plum, and the delicious apricot of Portugal, called damasco; damask, our beautiful fabric of cotton and silk, with vines and flowers raised upon a smooth bright ground; the damask rose, introduced into England in the time of Henry VIII.; the Damascus blade, so famous, the world over, for its keen edge and wonderful elasticity, the secret of whose manufacture was lost when Tamerlane carried off the arts into Persia; and the beautiful art of inlaying wood and steel with silver and gold, a kind of Mosiac—engraving and sculpture united—called damaskeening, with which boxes, and bureaus, and swords, and guns are ornamented. It is still a city of flowers and bright waters; the streams from Lebanon, the "rivers of Damascus," the "rivers of gold," still murmur and sparkle in the wilderness of "Syrian Gardone."

A Tidal Well.—For the last two or three months workmen have been engaged in sinking an artesian well in the rear of the Bay State House, in this city. It has already reached the depth of 123 feet, of which the last 53 feet are in the solid rock. Several water-bearing veins have been struck, but not sufficient to raise the water to the surface. The rock is a conglomerate composed of layers of slate, quartz, and other formations. It has been noticed that the water in the well rises and falls at nearly uniform periods, the fluctuation continuing from day to day. At the highest, the water rises 118 feet, or within 5 feet of the surface of the ground, and and falls to 106½ feet. It is a phenomenon for which the gentlemen acquainted with the subject have not been able to find a satisfactory explanation. The ground where the well is sunk was filled into the depth of 12 feet, when the house was built; so that the water at the highest already rises 7 feet above the natural surface. The work still progresses at the rate of about one foot per day.—*Worcester* (Mass.) *Spy.*

Economy and Railroad Speed.—During the past year, the Baltimore and Ohio Railroad have thoroughly tested the question of profit and loss by reducing the speed of their trains. The speed of heavy freight trains was reduced nearly 40 per cent, or to 8 and 9 miles an hour, and that of passenger trains to 20 and 25 miles per hour. Now, though the decrease in gross revenue was $272,903.50, the decrease in working expenses was $927,958.95; making the increase in net earnings $659,054.55. The company re-layed 53 miles of track, using 158,867 new white oak ties, besides ballasting with stone, improving the slopes and draining off the road. They start upon the new year with a better track and rolling stock than at any previous time. The number of casualties on this road, the past year, were less than at any former period.

Street Locomotive Cars.—In Chicago a combination car and engine for street railroads has just made its appearance. Externally, the car appears like those in common use, with the exception of two small chimneys seen at one end, and a small cylinder on each side. It is said by our Chicago exchanges to operate well; it runs at the rate of four miles per hour, and is more economical than horse-power for such purposes.

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VISIT TO A COTTON PLANTATION.

The following interesting particulars of a cotton plantation, &c., are culled from a letter of a correspondent of the New York *Herald*, who has recently visited the extensive plantation of Colonel Wade Hampton, near Columbia, S. C.:—

"The Hampton estate is situated on the Congaree river, and occupies about two thousand acres of bottom and upland. Millwood, the name of the mansion now occupied by Mr. Hampton, is situated on an eminence which commands a fine view of Columbia, the Congaree river and the surrounding country for 25 or 30 miles. It is built in the style of an English manor house, shaded with majestic and wide-spreading oaks, and ornamented in front with a spacious lawn and numerous flower beds. The approach to the house, a winding road, is thickly shaded with pine trees, magnolias and other evergreens, which give the place an appearance of eternal summer. The plantation is situated about a mile from Millwood, and occupies a river front of nearly two miles. It was purchased from the Indians by Colonel Hampton's grandfather, and was called 'Woodlands' by the aborigines, for the reason, perhaps, that it was bounded on three sides by the forest. The original homestead, which was occupied by General Greene during the revolutionary war, for several months, is still standing, and presents quite a respectable appearance yet. Old General Hampton, as he was called, was the first man who exported cotton from the country, and up to the time of his death he was the most extensive planter in the United States. When the plant was first introduced in South Carolina there were great doubts as to its successful culture. But General Hampton was convinced of the feasibility of the project, and planted nearly 1,000 acres of the seed, while his neighbors were afraid to venture upon more than would grow in their flower gardens. He was quite successful with his first crop, having gathered about 500 bales, which were sold in Liverpool at a handsome profit. Some of the buildings used in putting up those original bales are yet standing, but the machinery has all been supplanted by more modern inventions. Col. Hampton gave me a description of the cotton plant, and the manner of its culture. He stated that it was an extremely delicate plant, and was easily killed by frost or storms of wind and rain. It is an annual, and is sown from the seed in South Carolina about the 1st of April. If the weather is warm, the germ appears above the ground in about 48 hours after planting. During the first month of its growth it is subject to be attacked with a very destructive worm, and requires a great deal of care. After growing to the hight of from three to five feet, the tree blossoms. The blossoms remain only two days, when they fall off, and a small nut, about the size of a pea, appears. The nut gradually grows larger under the influence of the sun, until it assumes the proportions of a hickory nut. In September, this nut or 'boll,' as it is called, bursts open, and then the cotton is ripe for picking. The task of picking is a very laborious one, especially on those lands where the plants are below the average hight. In poor soil, where the trees are dwarfish and much stooping is required, picking is no easy task. The negroes are kept closely at work during the picking season, for the loss of a few days sometimes causes the ruin of an entire crop. From the field the cotton is conveyed to the mill, where the seeds are separated from the wool by a machine called the gin. From the gin mill it is sent to the press, where, by means of a large wooden screw, it is compressed into bales, weighing from 400 to 500 pounds, and then transported to market. It was about 11 o'clock in the forenoon when we reached the cotton fields. A number of hands were engaged in picking the late or 'stained' cotton, which the trees yielded after the regular picking season was over. This 'stained' article is of a very inferior quality, and is used only in the manufacture of the coarsest kind of goods. Nevertheless, on a large plantation it is quite an item of profit, and is carefully husbanded. The cattle are allowed free range of the fields at this season of the year, and might be seen quietly browsing within a few yards of the laborers. Further on we came to a field which was being plowed for the purpose of growing wheat, some 15 or 20 plows being thus engaged. In the barn-yard were some fine specimens of the Brahmin cattle and Cashmere goats which Col. Hampton has had imported expressly for his plantation and at a great cost. The Brahmin cows are noted for their good milching qualites. Some of those I saw have given as much as 30 quarts a day. The bulls are much larger than the native cattle, and are capable of doing heavier work. Of the Cashmere goats there were about 200 on the place. They are much prized for their wool, as also for the delicacy of their flesh. I must not forgot to mention another curiosity I saw. In an enclosure, hard by the barnyard, were three splendid looking elk—one male and two females. The male especially was a noble-looking animal, with antlers fully five feet in hight. The does were quite tame, but the buck was considered very vicious, and had a bad habit of attacking strangers whenever they approached him."

ARTIFICIAL MANUFACTURE OF ICE.

Some time since, "The Circle of the Scientific Press," of Paris, appointed a committee to examine an apparatus for making artificial ice, invented by Mr. Carré. This committee made a series of experiments on a practical scale, and their chairman, Mr. Gaugain, reported to the Circle at its session of Dec. 10, 1859. The report is published at length in *L'Invention* for December, and we translate and condense it for our readers. The cold is produced by absorption of heat—rendering it latent, and in the evaporation of ether—the ether being condensed and again made liquid by mechanical pressure. Our readers are aware that numerous efforts have been made to produce ice in this way, but heretofore the process has not been sufficiently economical to be of any practical value. Mr. Carre claims that he can produce 13 lbs. of ice per horse-power per hour, which would give about two pounds of ice for one pound of coal consumed.

The apparatus consists of an air pump for condensing the ether, and a respirator in which it is permitted to expand. This respirator resembles a locomotive boiler, with tubes closed at one end. It consists of a copper cylinder closed at both ends, with one head perforated full of round holes to receive a series of copper pipes, the pipes being closed at the lower or inner end and open at the upper end, where they are soldered tightly into the holes in the cylinder head. The water to be frozen is contained in tin tubes which pass freely into the copper pipes, where they are surrounded by a thin film of alcohol to prevent them from being frozen by any moisture accidentally present to the inner surface of the pipes. The cylinder, being filled with ether, which of course surrounds the copper pipes, is connected with the air pump in such a manner that the action of the pump draws out the ether in the form of vapor, and on the return stroke condenses it again into a liquid and forces it into a tight receiver. From this receiver it is let by a stop-cock into the respirator, where, the pressure being removed by the action of the pump, it returns to the form of vapor, absorbing and rendering latent 344° of heat, which, coming from the surrounding bodies, produces an intense cold and freezes the water in the tin tubes.

The report states that Mr. Carre has a plan for packing his piston-rod, which renders the escape of any vapor, however subtile, absolutely impossible. It also confidently expresses the opinion that ice may be profitably made in Paris by this process. Even if this is not true in relation to Paris, there may be localities in our country where it would be found to pay.

JAPAN WARES.—In Japan great quantities of lacquered ware are manufactured, also porcelain, which is of excellent quality. Silks are also abundant, and very cheap. They can be obtained for nearly the same prices as calico in the United States. Vegetable oils, wax, camphor, copper and gold are also among the exports from Japan. It is a remarkable country in many respects, and could we obtain the secret of manufacturing Japan varnishes, it would be of immense importance to us. Japan tea trays are made of *papier maché*, and the varnish on some of them is not the least affected with hot water or alcohol.

IMPORTANT TO INVENTORS, PATENTEES, &C.—Messrs. MUNN & Co., publishers of the *Scientific American*, have associated with them the Hon. Judge Mason, formerly U. S. Commissioner of Patents. This alliance, in addition to their former complete arrangements, will enable these gentlemen to give more attention than heretofore to the securing of Letters Patent. They have already achieved a world-wide reputation for the promptness and energy with which they have conducted their business, and parties in this city requiring assistance or information in the procuring of patents, will consult their own interest by applying to these gentlemen.

[We copy the above paragraph from our excellent cotemporary, the *Boston Post*.—EDS.

A COLUMN OF VARIETIES.

A large quantity of silkworms—82,000 ounces—have been collected in China, and sent by the way of San Francisco, New York and England, to Italy, on speculation. It is said to have been profitable, the worms selling at $4 per ounce.....The English government is now building four iron ships-of-war, two of 6,000 tuns each and two of 3,500. They are built by private contract and are to be protected with shot-proof iron plates, 4½ inches thick, around their sides.....A gentleman from the South, recently arrived at the Revere House, Boston, and reported that when he left home the peas were six inches high. At Washington he found the ice was four inches thick, and on reaching Boston he was told that an ice crop had been gathered that was 14 inches thick. In five days he passed through all these gradations of temperature.....We have received from Mr. Van Doren, Basking Ridge, N. J., a piece of cement with a portion of a newspaper upon it, on which the print is perfectly legible, though it has been four feet under water more than a year. The paper was spread over the surface of the soft cement when the latter was first laid.....Since the alteration in the newspaper stamp duty, no less than 411 penny publications have been brought into existence in the United Kingdom, of which 372 have already become extinct.....Official returns prepared at the Ministry of Marine, report no fewer than 409 shipwrecks of French vessels, during the month of November. Such a list of disasters in a single month is unparalleled..... The Vermont gold mines are said to be yielding largely. Two men purchased a claim for $225. They commenced digging in July, and up to Oct. 23d they had taken out $1,700.....Col. Fremont's right to the gold on his Mariposa estate has been settled, and it is said that he is now taking out $1,000 per day.....At the siege of Sevastopol the French fired 25,000,000 bullets, and as only about 25,000 Russians were hit, it follows that at least 999 shots in 1,000 were wasted.....Professor Dickson, of Jefferson College, Pa., says that men die ordinarily by the wear and derangement of the organs of which they make most use. "Adams and Webster made perpetual and unrelenting use of their strong brains which at last yielded, fatigued and exhausted; thus died Cuvier and Dupuytren, and Chalmers and Miller, and the long catalogue of annual victims to apoplexy and paralysis, *ramollissement* and other cerebral affections among men of active intellect."".....Telegraph wires are now generally coated with zinc to protect them from rust; one of those between this city and Boston is carried fifty miles inland to escape the action of sea air.....Carbonate of ammonia is composed of the four organic elements —carbon, oxygen, hydrogen and nitrogen; it is all pure manure.....Six Armstrong guns have lately been proved at the Royal Arsenal Butt, Woolwich. The charges consisted of the largest amount of powder with which it was possible to cram the chamber of each gun, and a couple or double shot. The guns were mounted for the occasion and fired on temporary carriages, in order to avoid the risk of chipping or other injury to which they are subject under the ordinary mode of firing on the ground. The terrible shock which the excessive charges produced brought the guns off their position with a perfect leap, and gave a recoil of 25 feet; nevertheless the thorough temper of the materials resisted the shock.....The detachment of Royal Engineers, recently embarked for China, on board the *Simoom*, is accompanied by a party of photographers, with the best instruments used in photography, for taking views of the defenses, earthworks, &c.....A jointed steamship, called the *Connector*, made in several sections, each being free to turn or rise and fall independently of the other, has been running for some time between one of the northern ports and London..... For coating iron ships the cement now used consists of an enamel which resists the influence of moisture, and the destructive effect of the chemical action of acids in bilge water; and is produced from salt, sugar, coal-dust, guano, and other materials. It requires about five hours to melt in a hot lava state, and is applied after a preparatory coating of prepared composition over a clean and dry surface.....The gathering of seaweed has been ordered by the French government to serve as wadding for artillery, for which purpose it serves admirably.....A monument is about to be erected to the late Mr. Brunel, and one in Sheffield to the late Robert Stephenson..... The search for the log-book and journal of Sir John Franklin will, it is said, be renewed next spring.

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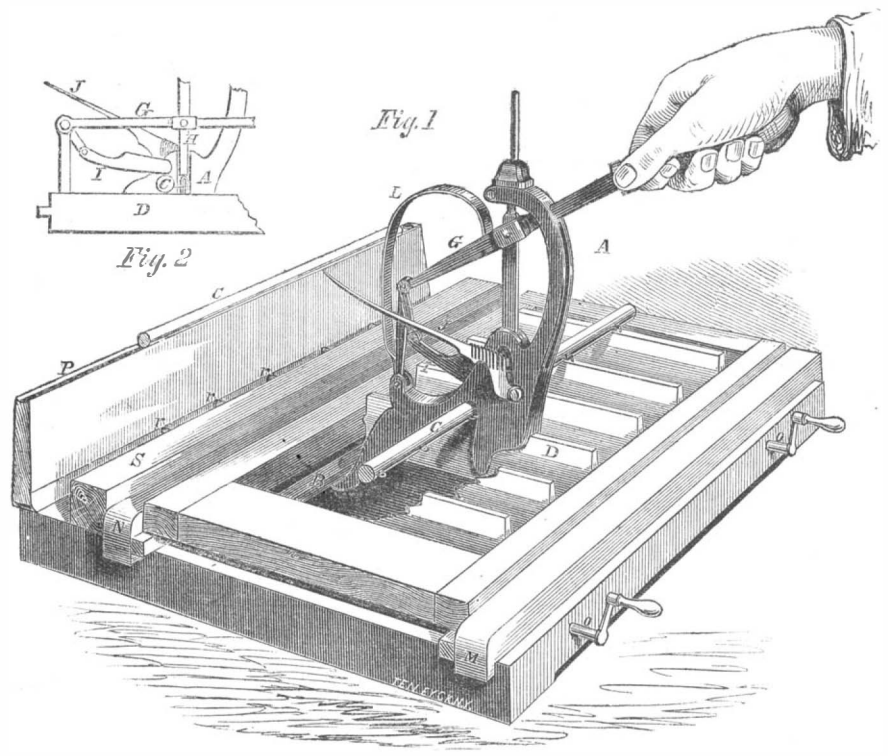
IMPROVED BLIND-WIRING MACHINE.

It takes but a short experience in watching the progress of inventions to teach a person not to pronounce anything perfect. It is not long since we described a blind-wiring machine which seemed to us as simple as one could be made, but we have one here certainly more simple still.

In the engraving it is shown in the act of inserting the staples into the slats to connect the rod to the blind. For this purpose the machine is placed astride of the rod with the bent toes catching under the stationary metal rod, B; and the handle is forced down, carrying one of the little wire staples, as shown in Fig. 2, with one leg through the staple in the rod C, and pressing it into the edge of the slat. As the lever, G, is depressed, the bent arm at its fulcrum end draws back the slide, I, and allows one of the staples to slip from the inclined needle, J, under the end of the descending press, H. The staples are placed upon the needle by dipping the latter into a box full of the staples and gathering them upon it. As it is necessary that the middle of the blind should always preserve the same position in relation to the metal rod, B, the clamps, M and N, which hold the blind are carried back and forth by a positive and equal movement by being connected with right and left screws on the rods, *o o*, which rods are furnished with cranks for turning them.

For inserting the staples into the rod, C, this is placed in the grooved rest, P, and the machine is placed astride of it at right angles to the position shown in the cut, with the hooked toes catching under one of the short rods or stops, *r r r r*, and after one staple is inserted, the machine is moved to the next stop and the operation repeated, the distance apart of the staples thus corresponding with the distance of the stops from each other. This distance is adjusted by boring holes at the proper distance apart in the bar, S; the stops, *r r*, being movable, and a bar, S, being required for each size of blind. The screw, *v*, is for adjusting the depth to which the wire is inserted, and the spring, L, raises the lever, G, to its place after the work is done. The machine is very light, weighing certainly less than a pound, and the inventor says that all who have worked with it have been much pleased with its operation.

The patent for this invention was issued Oct. 11, 1859, and persons desiring further information in relation to it will please address the inventor, Biram C. Davis, at Binghamton, N. Y.



DAVIS' BLIND-WIRING MACHINE.

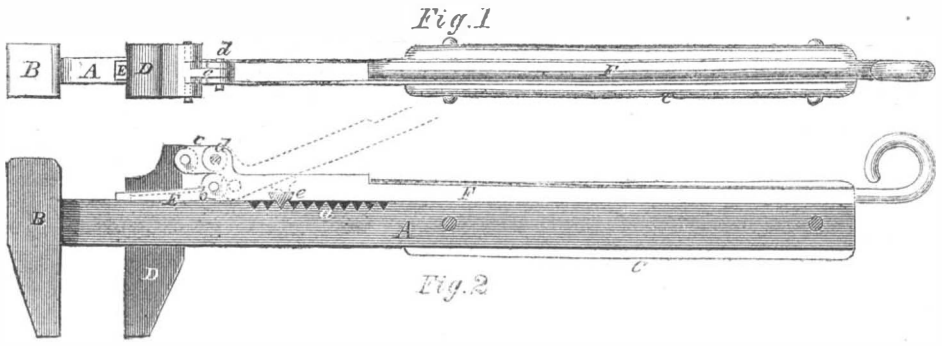
REMOVAL OF CARBON FROM RETORTS.

A correspondent of the *Journal of Gas-lighting* (London), writing from Copenhagen, states as follows:—

"Much inconvenience at times arises in gas-works from the accumulation of carbon in clay retorts, and the stopping-up of the stand-pipes. I myself suffered from this cause last winter, and was induced to devise a plan which I believe has not been adopted in England, for cleaning out the retorts and pipes; and as it has been completely successful, a description of the method will, I think, be of some interest to your readers. My retorts are of clay, 17 feet 6 inches long, and have a mouthpiece at each end. As soon as the deposit begins to be troublesome, I put into one of the mouthpieces of the retort a wrought-iron pan (shaped to the form of the retort), 18 inches long and 6 inches deep, filled with water. Both retort-lids are then put loosely on, and the cover of the stand-pipe at the end of the retort opposite to that in which the pan is placed is taken off. The open stand-pipe acts as a chimney, and draws the steam which is generated along the retort. The steam is decomposed by contact with the graphite, and in about 24 hours the latter can be loosened and removed with facility. The tar, &c., in the stand-pipe will also be completely burned out."

IMPROVED WRENCH.

The wrench which we here illustrate seems to us the most readily adjustable of any that we have ever examined. The movable jaw slides loosely on the bar and is wedged tight and held firmly in place by a very simple movement of a lever which will be understood by inspecting the cut.



BELL'S PATENT WRENCH.

The bar, A, having the permanent jaw, B, at its end, passes loosely through a rectangular slot in the movable jaw, D. This slot is made sufficiently large on the upper side to admit the wedge, E. This wedge is connected by a pivot, *d*, to the end of the movable lever, F, which is joined by the link, *c*, to the jaw, D. To adjust the jaw to the size of the nut or other body to be grasped, the lever, F, is turned upward as represented by the dotted lines, which movement draws the wedge, E, from its place and allows the jaw, D, to slide freely on the bar, A. When the jaw is slipped to the desired place, the lever, F, is turned downward against the bar, A, thus forcing the wedge, E, into the slot and holding the jaw, D, very firmly in its position. As the lever, F, is brought down against the bar, A, the projection, *e*, upon its lower side enters one of the notches in the serrated edge, *a*, of the bar, and the lever and jaw are thus prevented from sliding along the bar. The lever, F, is made somewhat larger than the bar, A, so that it may be readily grasped by the hand, and it will be seen that it adds its own strength to that of the bar; the whole arrangement forming a very strong and convenient wrench.

The patent for this invention was issued through the Scientific American Patent Agency, Dec. 20, 1859, and persons desiring any further information in relation to it will please address the inventor, A. J. Bell, at Ashland, Ky.

CINCINNATI PATENT LAW CASE.

Judson's Governor Valve.—At the December term of the U. S. Circuit Court held in Cincinnati, Ohio, a very peculiar suit at common law was tried, relating to the alleged infringement of the patent granted to Junius Judson, of Rochester, N. Y., Nov. 5, 1850, for a valve actuated by the governor of a steam engine. The parties were J. Judson, plaintiff, Moore & Wilstach, defendants. The latter pleaded the general issue, asserting that the plaintiff's patent was void because it was too vague; that Judson was not the original inventor, because others had invented and used the same arrangement previously; that the improvement claimed in the patent was of no utility; and lastly, the defendants did not infringe the patent; that their valve was not the same as Judson's invention. The case was on for ten days, and at one time the jury came in and desired to be discharged, because they could not agree; they were sent back by Judge Leavitt with further instructions, and at last, after being out all night, brought in a verdict of one cent damages.

This suit has caused no small amount of excitement among the engineers and mechanics in Cincinnati; and so far as it has gone this case amounts to almost no trial at all. It has been complained that in this case the rulings of the Court shut out important testimony on the part of the defense, after the plaintiff's main evidence was in, and that a very wide latitude was allowed to the one in comparison with the other. The valve used by the defendants is called the "Cope valve," and is held by a number of experts to be no part of Judson's invention. The principle of the patented Judson valve was stated by the Judge to consist of "an increase of opening through its whole range of motion." The meaning of such an expresston may be twisted two or three different ways. Another suit will soon come on, at which the same issues will be again tried, with the admission of more ample testimony. Until then any expression in relation to the merits of the case would be indiscreet, because unreliable.

TO INVENTORS AND PATENTEES.

Messrs. Munn & Co., Editors and Proprietors of the Scientific American, respectfully give notice that, in addition to their own experience of nearly fifteen years, they have now associated with them Judge Mason, who for several years held the office of Commissioner of Patents. This arrangement renders their organization thorough and complete, and is a sure guaranty that all business connected with the examination of inventions, preparing specifications, drawings, caveats, assignments of patents, prosecuting rejected cases, interferences, reissues and extensions of patents, and opinions of the infringement and validity of patents will receive the most careful attention.

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VOL. II., No. 7.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, FEBRUARY 11, 1860.

DEFECTIVE PUBLIC BUILDINGS.

THE sensation created by the falling of the Pemberton Mill, a few weeks since, has vibrated through every heart in the land, and the testimony taken before the coroner's jury on the case has been read by millions. By such information, the people at large have now become the unofficial, but not the less interested, judges of the cause of that calamity. A very great diversity of opinion prevails upon the subject. Most persons say "the testimony is so contradictory that we do not know what to make of it." There is one point, however, on which many seem to agree, namely, the immediate cause of the accident was the breaking of a cast iron pillar which supported one of the floors. It is believed that it first gave way, also the floor which it supported, carrying with it the walls, and crushing down all the floors beneath. We have been requested by several persons to express an opinion on the subject, from the printed evidence taken during the investigation, and will do so as briefly as possible.

By a careful examination of the testimony we are led to the conclusion that the Pemberton Mill was one of the most defective buildings for manufacturing purposes ever erected. Its walls were far too weak, and the iron pillars which supported the flooring were too few in number, and were inferior castings at that. Some of the floor beams also were too short, and were also improperly connected with the walls. All these deficiencies have come out in the investigation, and to us it appears perfectly conclusive that those who had the control of planning and erecting the mills did not do their duty, or they were incapable of filling the offices in which they were placed. We will give our reasons for expressing such opinions. The chief engineer, Charles H. Bigelow, testified that, at the time the Pemberton Mill was being built, he was also engineer of the Pacific Mill, and was so much engaged that he left the care of the erection of the former chiefly to his assistant, Benjamin Coolidge; still he was the actual ruling superintendent of the structure. To show how very weak the walls must have been, it is enough to state that the building was 284 feet long, 84 feet wide, 5 stories high, and the walls only 20 inches thick. Such feeble walls for a factory of such size, containing, as it did, masses of heavy machinery, never had a parallel in any country, we believe. The masons who had charge of the brickwork testified that, when they were putting up the walls, they complained of the quality of the bricks, and told the engineers that, in their opinion, the walls were too weak. This opinion of the masons was considered an impertinent criticism. Mr. Coolidge, the assistant-engineer, said he believed the structure was a very substantial one, with but one doubtful exception; that was the iron supporting pillars of the beams. One of these was broken during the time of their erection; its defect was made known to him, and he said "he always felt uneasy about them ever since." With such knowledge as he possessed, if he had persisted in refusing them, we think they would not have been used. It was also admitted by this engineer that the defective cast iron pillars employed were contracted for of a certain founder, because he offered to furnish them much cheaper than other parties. This is another damaging point which has been clearly proved.

Although a general opinion prevails that the immediate cause of the fall of the mill was the breaking of the cast iron pillar, we have not been able to find proof for this in the testimony taken. The smallest cast iron column used was five inches in diameter. Unless it had been thrust out of line by the springing of a beam or some other cause, we have no hesitancy in asserting that it could not have been broken; but if thrust out of perpendicular it would have broken like a reed. According to the testimony given by practical men, it appears that the pillars were placed so far apart that if one gave way the whole flooring would fall, and the walls also, as the beams were so anchored into the walls as to bring all down together. Such imperfect engineering appears to be without a precedent. Just conceive of the safety of such an immense factory depending upon the contingency of a single cast iron pillar five inches in diameter, and cast in a manner generally conceded to be very imperfect! The walls of all buildings belonging to corporate bodies, in which large numbers of persons assemble for labor or other purposes, should possess sufficient strength to stand alone. They should be strong and safe beyond peradventure; this was not the case with the Pemberton Mill.

PATENT OFFICE REPORTS.

We have before us a specimen number of the illustrations which form the third volume of the Patent Office Reports, for the year 1858. The work was executed at the establishment of E. K. Jewett, in the city of Buffalo, and appears to be done in a style superior to that of any of the preceding reports. The printing of these illustrations is done—not from wood-cuts, but by a process somewhat akin to that of electrotyping; but as the process is as yet a secret, we are not allowed to publish its exact nature. Some of the details are executed with great clearness, although so minute as to require a glass to be seen distinctly.

These illustrations cover 674 pages of the size prescribed by the act of Congress. The figures are made as small as is consistent with distinctness, and they are crowded together on the page as closely as it would seem practicable; there being on an average nearly six illustrations on each page. The whole number of patents in 1858 was 3,710, nearly all of which are illustrated with drawings, and most of them require two or more drawings to show those different parts and different views of the respective inventions in order that they may be fully understood.

The number of patents for the year 1859 is about five hundred greater than for the preceding year. If the number of patents shall be made to bear the same ratio to the number of pages as for the year 1858, it will require for these illustrations more than 750 pages in the report.

The act of Congress for 1837, requires the Commissioner of Patents to lay before Congress, annually, a detailed statement of the expenditure and payments made from the patent fund; a list of all patents which shall have been granted during the preceding year, designating under proper heads the subjects of such patents, and furnishing an alphabetical list of the patentees with their places of residence; a list of all patents which shall have become public property during the same period; *together with such other information of the state and condition of the Patent Office as may be useful to Congress or the public.*

In compliance with this latter requirement, it has been customary to make a very condensed description of each and every patent that has been issued during the year, stating only sufficient to give a general idea of the nature of the invention, when taken in connection with the illustrations corresponding with the respective descriptions.

All these matters require space. The letter-press (or reading-matter) of the report for 1858 fills two volumes of some 800 pages each. It is wholly impracticable to condense it into much smaller compass without rendering the descriptions unintelligible. And yet, by a resolution adopted by the last Congress, and upon which we have already commented in our issue of the 21st ult., the report of the Commissioner of Patents for the year 1859, with its 500 additional patents, is to be crowded into 800 pages, embracing letter-press, illustrations and all! This is simply impossible, if they are to be got up in such a way as to render them of any value at all. Rather than attempt such an impracticability, it would be far better to suppress the report altogether; at least so much of it as attempts to describe the patents that have been issued during the year. All else that is required by the existing law may be embraced in a volume of much less than 800 pages.

In preference to such a mutilation of the report, however, we would recommend that Congress give the copyright to some enterprising publishers, who would doubtless be willing to undertake it at their own risk and expense. The public, then, by paying their money, could become informed of what had been the operations of this important branch of the public service. This, although by no means commendable, would be far preferable to keeping them in ignorance, or attempting to communicate information in some impossible manner.

Or—what would probably be still better—let the inventors and patentees be taxed sufficiently to pay for the publication of these reports by having them printed at the expense of the Patent Office fund, and then sold or gratuitously distributed as may be deemed expedient. The Patent Office is now, in the main, a self-sustaining institution. This would render it almost entirely so. In that case it would be necessary to increase the expense of obtaining patents; but better so than worse. No class of men have contributed so much to the progress of our age and of our race as the inventors—none so much to the glory of our country. It would seem but just that they should receive their fair proportion of the benefits of the government to the support of which they contribute equally with other citizens, in addition to the fines paid by them into the Patent Office. But if the printing of public documents necessary to show the action of the government, and necessary to the due information of the people, is also to be thrown upon them, they would rather do that than not be put in possession of this most useful and interesting information. No documents published by the government are read with so much interest and usefulness, by so large a class of readers as these Patent Office reports—none that so well deserve to be published at the common expense.

It will we hope be understood that we do not recommend any of the measures above suggested, except as a choice of evils. We hold that each and all would be derogatory to the dignity and justice of the government but that they are either of them better than to undertake to crowd into the space of 800 pages, what cannot well occupy much less than three times that compass.

It might perhaps produce some effect upon the conduct of many members of Congress, if they could realize that although *machines* cannot vote, the *inventors* of those machines can—that a continuance of what they will feel as an injustice will be calculated to drive them into organizations for their own protection—and that the proper method of preventing this is to obviate the cause. This is not intended for a threat, but merely a warning.

THE NEW COMMISSIONER OF PATENTS.—At the moment of going to press, last week, we learned and accordingly published (in our first edition only) the statement that the Hon. Samuel C. Ingham, United States Commissioner of Customs, had been appointed to succeed Mr. Bishop as Commissioner of Patents. The appointment was tendered to Mr. Ingham, and we were informed that he had decided to accept it, which fact was also confirmed by the telegraphic correspondence of the daily papers. It now turns out that, upon further consideration of the matter, he thought it would not *pay* to "swap off" an office with whose duties he was familiar for another of the same salary but of more responsibility, and requiring more study to master its details. The latest and probably the most reliable phase of the matter is that Ex-governor P. F. Thomas, of Maryland, has been appointed Mr. Bishop's successor.

A SOCIAL GATHERING.—A few evenings ago, our distinguished fellow-citizen, Mr, Cyrus W. Field, gave (at his residence) a splendid reception to Mr. Du Chillu, who has recently returned from explorations in Central Africa. The company present was large, and included many of our most eminent men of science and learning. The whole affair was exceedingly social and agreeable.

A LEGISLATIVE LOCOMOTIVE!—On the New Jersey Railroad they have a passenger locomotive bearing the name of Governor Pennington, the lately-chosen Speaker of the House of Representatives. When the news of the distinguished gentleman's election was received by the engineer, the way he piled on the flags and banners, and made the machine to scream and snort, was a "caution."

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THE STEAMER "SETH GROSVENOR."

The steamer *Seth Grosvenor*, built by the "New York State Colonization Society," to run between Cape Palmas or Montsonia, on the coast of Siberia, to meet the requirements of the local trade, has just been completed. The destination of this vessel is an initiatory step in an enterprise believed to be fraught with good results to African colonization; and as soon as authentic intelligence can be obtained from the coast of Africa, relating to the existing state of affairs there, she will be dispatched on her important duty. Her dimensions with particulars of engine and boiler, are as follows:—Length on deck, from fore-part of stem, to after-part of stern-post, above the spar deck, 95 feet; breadth of beam, at midship section above the main wales, 16 feet 10 inches; depth of hold, 5 feet; depth of hold to spar deck, 5 feet 3 inches; draft of water at board line, 3 feet; size of engine-room, 27 feet by 6 feet; area of immersed section (at load draft of 3 feet) 39 square feet; tunnage, 68 tuns. She is fitted with a steeple engine; diameter of cylinder, 28 inches; length of stroke of piston, 3 feet 6 inches. Diameter of water wheels (over boards) 14 feet 4 inches; length of wheel blades, 1 foot 3 inches; and she has 14 blades. She has one return tubular boiler, the length of which is 12 feet 6 inches; breadth, 5 feet 9 inches; hight (exclusive of steam chimney) 6 feet 10 inches; and beneath this there is one furnace—breadth 5 feet; length of fire-bars 4 feet 6 inches; there are 36 tubes—30 of 4 inches (internal diameter) and 6 of 3 inches. The internal diameter of the four flues is 2 of 8 inches and 2 of 15 inches; length of tubes above, 9 feet; length of flues below 6 feet. The diameter of the smoke-pipe is 2 feet 3 inches; hight, 24 feet; draft forward, 3 feet, draft aft, 3 feet.

The cube of grate surface is 225 feet 5 inches, and possesses a heating surface of 540 square feet. The furnace will consume two tuns of fuel per day, The frame is of white oak and hacmetac and square, fastened with copper and trenails; frames not filled in, solid, and moulded 16 inches apart at centers. The floors are molded at the throats, 6 inches; rided 3 inches. The boiler is located in the hold, and protected from communicating fire by felt and iron. Her rig is that of a schooner, not coppered; bunkers of wood, and is supplied with two anchors. She is fitted with one independent (steam) fire and bilge pump, and has bottom valves to all openings in the bottom. The builder of the hull is Henry Steers; builders of engines, the Allaire Works; superintending engineer, C. H. Haswell.

EFFECT OF FOOD UPON RESPIRATION.

Dr. Edward Smyth read a paper, on Feb. 10, 1859, before the Royal Society, giving the results of over 2,000 experiments which he has been making to ascertain the effect of different kinds of food on the quantity of carbonic acid expired from the lungs. He found that most kinds of food increase the quantity of carbonic acid given off from 1 to 3 grains per minute, the effect commencing soon after the introduction of food into the system and attaining its maximum in about two hours. The most powerful stimulants of respiration are tea and coffee, which sometimes increase the quantity of carbonic acid evolved three grains per minute. The experiments showed that the following-named substances are classed as follows in their effect on the lungs:—

Exciters of respiration—Sugar, milk, cereals, potato, gluten, casein, gelatin, fibrin, albumen, tea, coffee, cocoa, chicory, alcohol, rum, ales. Non-exciters of respiration—Starch, fat, coffee leaves, brandy, gin.

PUBLIC ART MUSEUMS.

Rev. Geo. Duffield, D.D., of Detroit, lately delivered the opening lecture before the Rogers Art Association, at Ann Arbor, Mich. The subject of his lecture was: "The Results of Research and Discovery in Egyptian and Assyrian Antiquities." He dwelt upon the importance of establishing art museums in this country, and the obligation resting upon the University of Michigan to take the lead in the matter. We are glad to know that we have such an eloquent advocate of these views in Professor Duffield. On page 401, Vol. I. (new series) of the SCIENTIFIC AMERICAN, we endeavored to impress upon the minds of the public the benefits that would result to the people by the establishment of public museums of art. It would be a high honor to Michigan if that State took the lead of all others in this great social agency of mental elevation.

SINGER'S IMPROVED HOSE COUPLING.

The hose coupling represented in the accompanying cuts seems to be a very simple, efficient, and promptly-acting device, and well worthy the attention of firemen, and all other persons interested in the ready operation of fire-engines; and who in the community is not?

To the end of one piece of hose the metallic cylinder, A, is securely attached, and to the end of the other piece to be coupled is attached the cylinder, C; the latter cylinder having the enlargement, H, cast upon its end of a size to admit the end of the cylinder, A. This enlargement is provided with a groove to admit the gasket or elastic packing ring, *a*, Fig. 2, against which the end of the cylinder, A, abuts as shown. The cylinder, A, is

Fig. 1

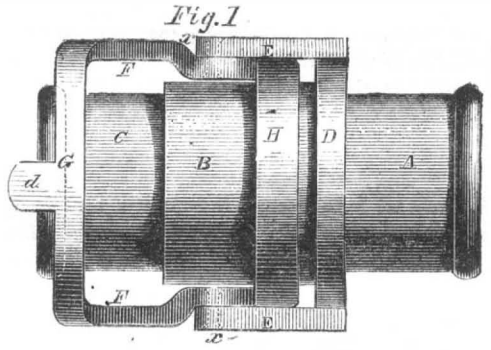
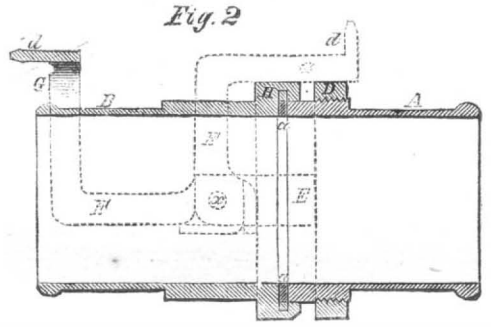


Fig. 2



inserted in the large end of, C, and to illustrate the mode in which its end is pressed firmly against the packing, *a*, and held in place, the coupling is shown in Fig. 2 as turned one-fourth round from the position represented in Fig. 1. The metallic ring, D, is secured upon the cylinder, A, and has the arms, E E, cast or soldered upon it. Connected with these arms by means of the pivots, *x x*, are the levers, F F, of which the long arms are joined together by means of the semi-circular bar, G, and the short arms are made in the shape of eccentric cams, so that when the boxes are turned down as represented in Fig. 1, and in the full lines in Fig. 2, the cams press against the projection, H, on cylinder, C, and force this cylinder against cylinder, A, while by turning the levers, F F, out from the coupling in the position shown by the dotted lines in Fig. 2, the short arms of the levers are released from their pressure against the projection, H, and the two parts of the coupling fall asunder. As the packing, *a*, becomes condensed or worn, the end of cylinder, A, is made to follow it inward by the simple plan of screwing the ring, D, further upon the cylinder, A.

The inventor claims that hose may be coupled with this arrangement while the water is flowing through it with force. At all events it appears to be a very simple and efficient coupling, by which hose may be joined very quickly indeed, and a smooth, neat, and light joint be made.

The patent for this invention was issued, through the Scientific American Patent Agency, Jan. 3, 1860, and persons desiring further information in relation to it, will please address the inventor, Joseph Singer, Drawer 376, Cleveland, Ohio.

PATENT EXTENSION CASE.

Electric Telegraph.—Samuel F. B. Morse, of Poughkeepsie, N. Y., has applied for the extension of a patent granted to him on the 11th of April, 1846, for an improvement in electro-magnetic telegraphs. The said petition will be heard at the Patent Office on Monday, the 2d of April, at 12 o'clock M.; and all persons interested in opposing the same are notified to appear and show cause (if they have any) why said petition ought not to be granted. The testimony in the case closes on the 19th of March.

FOREIGN NEWS AND MARKETS.

Although much has been said and written about the *Great Eastern*, it appears that all is not yet over in this line. A great deal has been rather hinted at than fairly charged against her builder, J. Scott Russell, for all its defects—low speed and everything else. He was really looked upon by the public as a kind of delinquent in this case, and so at last he has come out in a report to the directors, of an exculpatory character. He states as an excuse for her low speed, that she was not designedly built for a high speed steamer on a short voyage, but for a uniform speed of more than ordinary velocity, so as not to be affected by storms, and thus make long voyages to Australia and India, more rapidly and more economically than any other steamer of a less size. Respecting her qualities he asserts she has proved handy and manageable, so as to go into and out of any harbor in this or other countries that afford suitable traffic. She has ample power to stand up in sea-way or storm, without such rigid stiffness as to make the sea strike her with violence. She has proved that, in danger from external violence, or internal accident, her system of separation into compartments is so successful that no damage to one part of her affects another. She has realized the speed for which she was designed, and which is such as to enable her to reduce the time of a voyage to Australia from 59 to 30 days. She not only can carry coals for the entire passage to Australia, but find room besides for 5,000 tuns of goods. Along with this she affords ample accommodation for from 500 to 800 first-class passengers, and might be fitted up for 1,000 additional berths, as first and second-class, and 1,500 third-class, if desirable. She has been proved to afford comparative immunity from sea-sickness, along with the comfort and luxury of a first-class hotel, thus rendering a passage across the sea in every way more enjoyable than a long journey by land.

James Nasmyth, the inventor of the steam hammer, has taken out a patent for a siphon motive power. In that part which connects the two limbs of the siphon, valves are fitted to cut off the connection with the limbs. In a cylinder connected with one limb there is a small portion fitted, and its rod is attached to a shaft to which it gives motion for operating the valve and driving machinery. A small air-tight chamber is connected with the piston cylinder by a valve. When water is let into the limbs of the siphon, the piston connected with the discharging limb is made to rise, and when it has reached the end of its stroke, the valve is shut to cut off the inlet water, and then the one is opened into the air-chamber, when the water flows from under the piston and it descends. In this manner a continual reciprocating motion is to be given to the piston—a perpetual power without the use of a dam or material waterfall.

The steamships of the Peninsular and Oriental Steamship Company consume from four-and-a-half to five pounds of coal per horse-power per hour, and the total cost of fuel is £650,000 per annum. By adopting the most recent improvements, this company can save one-half the expenses for fuel, as the Pacific Steam Navigation Company, whose vessels run on the coast of South America, consume only two or two-and-a-half pounds of coal per horse-power in an hour.

Many of the heavy iron rolling mills in England and Scotland have lately adopted the frictional gearing system in place of toothed wheels. The rim of the main fly-wheel is made with a groove in it, and a wedge-faced pinion gears into the groove. In most of the calico print-works in Glasgow, the same arrangement of driving gearing has been adopted; and in a few years it is supposed no other mode of connecting the wheels of machines will be in use in England.

By experiments recently made by W. Fairbairn, Esq., and Thomas Tate, Esq., at Manchester, England, to test the strength of glass vessels of various forms, it was found that the resistance of glass to a crushing force was equal to 13.460 tuns per square inch. Taking flint glass at 1.000 in strength, green glass is 1.152, and crimson glass 4.124—flint the weakest.

The following rule is in force on some of the German railways: In the waiting-room of each station, and in each booking-office, books are kept open for any complaints that travelers may think themselves authorized to enter therein, accompanied with the name, rank and residence of the complainant. The German railroads

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are the safest in the world; accidents are almost unknown on them.

No change has taken place in the metal market since last week. The prices are ruling favorably for the manfacturers, and business is good throughout the entire country.

NEW YORK MARKETS.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 50c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Anthracite, $4.50 a $5; Liverpool orrel, per chaldron, $12; cannel, $13.

COPPER.—Refined ingots, 24c. per lb.; sheathing, 27c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8¼c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 9c. a 9¼c.; good ordinary, 9⅞c. a 10⅜c.; middling, 11⅜c. a 11⅞c.; good middling, 12c. a 12¾c.; middling fair, 12⅞c. a 13¼c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8½c.; sheetings, brown, 36 a 37-inch, per yard, 5¾c. a 8¾c.; sheetings, bleached, 36-inch, per yard, 7½c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8¾c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 85c. a $1.37; cassimeres, 85c. a $1.37½; satinets, 30c. a 60c.; flannels, 15c. a 30c.; Canton flannels, brown, 8½c. a 13c.

DYEWOODS.—Barwood, per tun, $18 a $20; Camwood, $130; Fustic, Cuba, $35 a $36; Fustic, Tampico, $25; Fustic, Savanilla, $20 a $22; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $23 a $23; Logwood, Tabasco, $21; Logwood, St. Domingo, $14.50 a $15; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $13.50 a $14; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $4.95 a $5.10; Ohio, common brands, $5.20 a $5.30; Ohio, good and choice extra brands, $5.80 a $6.75; Michigan, Indiana, Wisconsin, &c., $5.20 a $5.30; Genesee, extra brands, $5.60 a $7.25; Missouri, $5.30 a $7.50; Canada, $5.50 a $6.75; Virginia, $6.25 a $7.25; Rye flour, fine, $3.75 a $3.90; corn meal, $3.80 a $4.20.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $95 a $97. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5½c.

INDIA-RUBBER.—Para, fine, 55c. per lb.; East India, 50½c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60 c. a $1.10; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $25 a $26; bar, Swedes, ordinary sizes, $85 a $86; bar, English, common, $42.50 a $43.50; refined, $52 a $54; sheet, Russia, 1st quality, per lb., 11¼c. a 11½c.; sheet, English, single, double and treble, 3½c. a 3⅞c"; anthracite, pig, $24 per tun.

IVORY—Per lb., $1.25 a $1.30.

LATHS.—Eastern, per M., $1.75 a $2.

LEAD.—Galena, $5.75 per 100 lbs.; German and English refined, $5.70 a $5.75; bar, sheet and pipe, 6¼c. a 7c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 20c. a 21½c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 a $20; Patent enameled, 16c. a 17c. per foot; light Sheep, morocco finish, $7.50 a $8.50 per dozen; Calf-skins, oak, 55c. a 60c. per lb.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c.

LIME.—Rockland, 75c. per bbl.

LUMBER.—Timber, white pine, per M. feet, $17.75; yellow pine, $35 a $36; oak, $18 a $28; Eastern pine and spruce, $14 a $15; White Pine, clear, $35 a $40; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c.a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $58; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3⅜c. per lb.; American clinch, 5c. a 5¼c.; American horse-shoe, 14¼c

OILS.—Olive, Marseilles, baskets and boxes, $3.35 a $3.50; Olive, in casks, per gallon, $1.12 a $1.25; Palm, per pound, 9c. a 9¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 48c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.40 a $1.45; sperm, unbleached winter, $1.47; lard oil, No. 1, winter, 90c. a $1; red oil, city distilled, 57c.; Wadsworth's refined rosin, 30c. a 40c.; boiled oil for painting, 35c. a 40c.; tanner's improved and extra, 30c. a 40c.; camphene, 44c. a 46c.; fluid, 50c. a 53c.

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American. pure, in oil, 8c.; lead, white, American, pure, dry, 7¼c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9½c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c. a 90c. per 100 lbs.; vermillion, Chinese, $1.12½ a $1.22; Venetian red, N. C., $1.75 a $2.25 per cwt.; chalk, $4 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Turpentine, soft, N. C., per 280 lbs., $3.50 a $3.56; Wilmington, &c., $3.50 a $3.56; common, per 310 lbs., $1.55 a $1.58; strained and No. 2, $1.62 a $1.95; No. 1, per 280 lbs. $2 a $2.75; white, $3 a $4; pale, $4.50 a $5.50.

SALTPETER.—3¾c. a 12c. per lb.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.; Olive, 7c. a 7½c.

SPELTER plates, 5c. a 5¾c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4½c. a 5½c.

SUGAR.—New Orleans, 7c. a 8¾c. per lb.; Porto Rico, 7c. a 8¾c.; Havana, brown and yellow, 7c. a 8¾c.; Havana, white, 9c. a 9¾c.; Brazil, white, 8c. a 8¼c.; Brazil, brown, 7¼c. a 7½c.

SUMAC.—Sicily, $70 a $80 per tun.

TALLOW.—American prime, 10¾c. a 10½c. per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.50 a $9.25½, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.; extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 43c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7½c. per lb.

The foregoing rates indicate the state of the New York markets up to February 3d.

There was great dullness in the markets last week; many persons have blamed the long contest for Speaker in Congress as one great cause of uncertainty, and consequent flatness in the general business. It is hoped that since a speaker has at last been fixed upon, there will be less speaking and more legitimate business done, both in Washington and New York.

The Chamber of Commerce has held two meetings to protest against the passage of what is called "The Prorata Freight Bill," now before the legislature. The bill provides for charging tolls on our railroads—the erection of a huge State toll-gate to injure the growing railroad interests of the State. Such a bill is not only unjust but very impolitic.

There is a very large stock of flour on hand, and as the demand from abroad is very moderate, the tendency of prices is slightly downward.

Thirty journeymen shoemakers of Lynn have petitioned the Massachusetts legislature to be incorporated as a shoe manufacturing company, with a capital not exceeding $50,000.

The lumber trade in Maine is represented as more promising than since 1855. The operations in the woods are in excess of last year, with a promise of thrift so far.

From September last to January about 15,000 barrels of apples were brought to New Bedford, Mass., some 7000 of which were transported by the propellers *Wamsutta* and *Potomska*.

Mr. La Mountain, the aeronaut, is constructing four new balloons, at Lansingburgh, N. Y., to be used for making local ascensions. Mr. John Wise is also building a balloon with which he proposes to make an ascension from Kingston, C. W., on the 24th of May next.

The owners of the Pemberton Mill, at Lawrence, Mass., have, we understand, made a claim upon the insurance companies for the entire amount of the insurance, $415,000, and have retained legal counsel in case the claim is resisted.

A ship canal across Cape Cod (says the Boston *Transcript*) which would save 150 miles of dangerous navigation around the Cape, lessening the rate of freights, and doing an almost incalculable good to the commerce of the State, will soon be considered by the legislature. The expense of building such a canal has been estimated, from surveys taken, at about $500,000.

The New Orleans *Picayune* of the 25th ult. says that the exchange market has been exceedingly languid. The supply of both foreign and domestic exchanges continues ample, and the demand for any description is little better than nominal.

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

PORTABLE CANOPY.

This invention is a portable canopy from which is to be hung a musquito net. The canopy is constructed in such a way that it can be readily taken to pieces and packed away in a very compact manner, each piece forming the canopy and stand can be detached from its other piece; the canopy frame itself can be taken to pieces and the parts folded up; at the same time, when the parts are all put together, they will form a substantial firm support for the net or covering. The parts will all be light can be made of cheap material, are capable of receiving ornamentations, can be adjusted to suit various circumstances, are not attached to the bedstead, and can therefore be removed to one side for making up the bed, or when not in immediate use. The canopy can be raised or depressed and fixed in its adjusted position. The patentee of this invention is Isaac E. Palmer, of Montville, Conn.

BRUSH BLOCKS.

This invention consists in the employment of double-edge reciprocating cutters in connection with guides, the parts being so arranged that the cutters may act upon their work, during both their upward and downward movements. The invention consists in the employment of a pattern in connection with the guides above-named, the pattern being so arranged that it may be rotated or turned on a center so as to admit of the shaping of the brush blocks without reversing the same from the pattern. The invention further consists in the employment of an adjustable bed and clamp so arranged as to admit of the facile manipulation of the pattern which is attached to, and centered on said bed. The object of the invention is to expedite the cutting out or shaping of brush blocks both as regards the operation of the cutters, and the manipulation of the work in presenting it to the action of the cutters. This improvement was designed by A. G. Mitchell, of Lansingburgh, N. Y.

ELECTRIC TELEGRAPHS.

This invention relates to the use for submarine and other electric telegraphs of wires or conductors which are encased with gutta percha or other insulating material, and have such insulating material enveloped with a sheathing of metal. When the wire or other primary conductor is thus encased and sheathed, the current passing through it induces a current in the metal sheathing; and the invention consists in collecting this current and using it, either in connection with the primary current passing along the inner wire or conductor, or alone, for the purpose of working telegraphic instruments. The credit of this contrivance is due to George Doyle, of Ottawa, Ill.

PRINTING PRESS.

The object of this invention is to obtain a flat impression press, that will print rapidly, be very compact, simple in construction, printing both sides of the sheets at one operation, or with but one passage through the press, and one that will admit of having certain necessary parts readily adjusted for the printing of different sized sheets, and also one that will admit of polychromatic printing with a perfect register. This device has been patented to John W. Latcher, of Northville, N. Y.

CALENDAR CLOCKS.

This invention consists in certain novel means of governing the movements necessary at the changes of the months, more especially the variable movement in the change from February to March, which are less liable to get out of order than the mechanism heretofore used for the purpose, and hence more reliable and certain in their operation. The inventors of this improvement are Eugene M. Mix, and James E. Mix, of Ithaca, N. Y.

THE RISE AND PROGRESS OF INVENTIONS.

ADVICE TO INVENTORS.

During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & Co., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,175; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business; and at this time there is scarcely a town of 4,000 inhabitants, but has its patent agent, patent lawyer, patent solicitor, or patent attorney, all of which terms are used to convey the same idea—viz., that their services are offered to the inventor or patentee for a pecuniary consideration.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world. Year after year, we have increased our facilities for transacting patent business, by gathering around us a large corps of the most eminent engineers, draughtsmen and specification writers that can be procured. Among these gentlemen are those who have been connected with the United States and Foreign Patent Offices. The latest engagement we have made is the association with us of Hon. Charles Mason, formerly COMMISSIONER OF PATENTS, and favorably known to the Inventor as their friend and advocate. The memory of his acts while holding this high position will be cherished by many an honest inventor with gratitude as long as he lives.

The arrangement made with Judge MASON renders our facilities for prosecuting all kinds of patent business complete, however ample they were before; and without being accused of egotism, we may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c.

FREE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable are advised to make a sketch or model of their invention, and submit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with

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the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of similar inventions from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons, under the direction of a gentleman who has spent a lifetime about the Patent Office. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $20. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, enclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that three-fourths of all the European patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

INTERFERENCES.

We offer our services to examine witnesses in cases of interference, to prepare arguments, and appear before the Commissioner of Patents, or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "Hints to Inventors." Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Many persons have been ruined from adopting the "penny-wise and pound-foolish" maxim, when an investment of a few dollars, to have been informed of their rights, would have saved them much anxiety and money. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. Judge MASON assists in all examinations of this kind.

For further particulars, address MUNN & CO., No. 37 Park-row, New York.

EXTENSIONS OF PATENTS.

Valuable patents are annually expiring, which might be extended, and bring fortunes to the households of many a poor inventor or his family. During the past fourteen years, we have had much experience in procuring the extension of patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we never lost but two cases—and those were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to ensure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased patentee may apply for an extension. Parties should arrange for application for an extension at least six months before the expiration of the patent.

For further information, and forms and mode of procedure, in obtaining an extension, address MUNN & CO., No. 37 Park-row, New York.

ASSIGNMENT OF PATENTS.

The assignment of patents and agreements, between patentees and manufacturers carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the inventor or patentee may be served at our offices; and we will close these somewhat lengthy remarks on patent matters by inviting all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of patentees will be cheerfully answered. Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING JANUARY 31, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

26,962.—H. B. Adams, of New York City, for an Improvement in Fan Blowers:

I claim the casing, e, of the described configuration, when in combination with double working plane surface blades, c c, as described.

26,963.—J. A. Bassett, of Salem, Mass., for an Improvement in Apparatus for Decomposing Steam:

I claim the employment of a retort furnished with a hollow pipe in the axis of the retort, perforated in the manner set forth, the whole operating in the way and for the purpose described.

26,964.—W. W. Batchelder, of New York City, for an Improved Method of Lighting Gas by Frictional Electricity:

I claim attaching the electrometer to the gas fixture, substantially as and for the purposes set forth, meaning by gas fixture, that part of the gas-pipe or conductor which is in proximity to the burner, and to which the burner is attached, whether it be a bracket, drop light, chandelier, or stand, or other analogous fixture.

I also claim connecting the electrometer with the stop-cock, so that the act of turning the same, to "let on" the gas, shall bring the electrometer with action as set forth,

26,965.—C. F. Baxter, of Boston, Mass., for an Improvement in Filters:

I claim operating the movable diaphragm within the globe, substantially as described and for the purpose set forth.

26,966.—W. D. Bunting, of Cleveland, Ohio, for an Improvement in Compositions for Tanning Skins and Hides:

I claim the composition of terra japonica, nut galls, elder, alum, salt, whiting and starch, in the proportions stated, in the manner and for the purposes set forth.

[This invention consists in the employment of the tanning ingredients specified, so combined and employed as to shorten the process of tanning considerably, and yet produce firm, durable and flexible leather, possessing a most beautiful and smooth surface.]

26,967.—G. Colhoun, of Philadelphia, for an Improvement in Ventilators:

I claim the inner and outer receiving cones, C D, elbow pipe, B, and flaring discharge pipe F, when the whole is constructed, arranged and combined, substantially as and for the purpose set forth.

26,968.—V. M. Chaffee, of Xenia, Ill., assignor to himself and C. DeWitt Smith, of Washington, D. C., for an Improved Clamp for Making Clevis:

I claim, first, The clevis clamp or tongs, composed of the jaws, A and A', constructed as described, and operating in the manner specified.

Second, I also claim the combination of the jaws, A and A', with the handles, B and B', or their equivalents, for operating the jaws, in the manner described.

26,969.—J. B. Currier and A. J. Simpson, of Lowell, Mass., for an Improved Arrangement of Air and Mercurial Thermometers:

We claim the combination of the sealed thermometer and the barometric thermometer, when both have the same range, from temperature, for determining the pressure of the atmosphere, substantially as described.

Second, We claim the method of adjusting the two thermometers, so that a change in the weight of the atmosphere will be indicated by their variation.

26,970.—Lester Day, of Buffalo, N, Y., for an Improved Churn:

I claim, first, The breakers, E, having shoulders or offsetts, H, and and H', and permanently connected to the crosspiece, F, so as to be removable therewith, and extending from the crosspiece to the bottom of the churn, for the purposes and substantially as described.

Second, The adjustable dash blades, D, placed diagonally on the arms, C, and arranged to operate with the breakers, F, for the purposes and substantially as set forth

26,971.—B. F. Delano, of Boston, Mass,, for an Improved Attachment for Rudders:

I claim the described device, g h k, or its substantial equivalent, for tightening up the rudder, operating substantially as described.

26,972.—T. H. Dodge, of Washington, D. C., for an Improvement in Combined Reaping and Mowing Machines:

I claim, first, The combination of the inclined projecting end of the beam, D, with the rear end of the main frame, A, and draft connection, h, substantially as set forth.

Second, I claim the combination of the shoe or brace, H, with the sheath or tube, H', and hinged forks or arms, I I, substantially as set forth.

Third, I claim extending the journals of one of the forks, I, of the sheath or tube, H, through its hinge, to form the journal of the pulleys, 6 and 7, the parts being arranged substantially as set forth.

Fourth, I claim the combination of lever, m, with its dog, m', with case, H', and shoe, H, substantially as set forth.

Fifth, I claim making the upper part of the raker-box, in the form of a hollow frustrum of a cone, and the bottom concave, substantially as shown in Figs 7, 8 and 9.

Second, I claim covering the surface of the reel ribs with india-rubber, or its equivalent, substantially as and for the purposes set forth.

26,973.—George Doyle, of Ottawa, Ill., for an Improvement in Electric Telegraphs:

I claim collecting a current induced by a current passing through a primary conductor in a metal sheathing surrounding but insulated from the primary conductor, and employing such induced current either in connection with the primary current, or alone, to work telegraph instruments, substantially as described.

I also claim combining the action of the primary and induced currents, by means of two electro-magnets, one in each circuit, so applied in combination with a lever carrying both their armatures, that both magnets act in concert to move the said lever, substantially as specified.

I also claim combining the use of hardened steel cores in the electro-magnet of the induced current with the use of soft iron cores in the electro-magnet of the primary current, substantially as and for the purpose specified.

26,974.—Eugene Duchamp, of St. Martinsville, La., for an Improvement in Furnaces for Evaporating Sugar Juices:

I claim the described arrangement of horizontal steam boilers, E, in rear of the furnace, K, flue spaces formed by walls, B B, whereby the flame and smoke is directed from the furnace, K, between the walls or partitions, A A and B, to the rear of the furnace, and thence under the steam boilers through the furnace, D, when it finally escapes up through the chimney, M, as indicated by the direction of the arrows. This I claim, in combination with the pipes, G, H and L, arranged under and serving as supports for the evaporating pans, all in the manner and for the purposes described and represented.

[This invention is an improvement in sugar works. It consists in arranging in the rear end of the works two horizontal steam boilers, and in connecting with the rear end of these, and below the water line of the boilers, pipes, which are supported upon brackets on the inside of, and near the top of walls which surround the boilers, said pipes being kept full of water from the steam boilers; and it consists in making these pipes serve for supporting the "train" of evaporators, instead of resting them upon arches of brickwork. The invention further consists in the arranging of a furnace in front of the works, over which is supported the "battery pan," and in so constructing the works that after the steam has been raised in the steam boilers by a fire under them, this fire may be extinguished, and the fire in the "battery pan" be made to subserve the purposes of keeping up the steam, and, at the same time, to supply sufficient heat for two "trains" of evaporators, employing only one chimney for this purpose, where three distinct fires would be necessary under the present system in order to effect the same amount of work.]

26,975.—Daniel N. Dunzack, of Salem, Mass., for an Improved Method of Operating Stop-cocks:

I claim the arrangement and combination of the several parts when arranged and combined as described for the purpose set forth.

26,976.—Joseph L. Dutton, Jr., of Cherry Lake, Fla., for an Improvement in Plows:

I claim the arrangement of the beam, A, notched adjusting bar, I, handles, D, cross bars, C, hooked staple, H, and wedge, F, with the notched heel, C, and notched and slotted toe, B; the whole of the parts being constructed for joint adjustment as set forth.

26,977.—Jacob Edson, of Boston, Mass., for an Improvement in Machines for Cutting and Splitting Leather:

I claim, first, The bent knife, so constructed as to cut the leather both to a width and thickness, either in a horizontal or a beveled line, at the same time, and whereby a cutter of greater strength and stiffness is obtained, as set forth.

Second, I claim the use of the tongue, i, operating upon the leather as described and for the purpose specified.

Third, I claim attaching the cutter or cutters to a stock made adjustable, so as to vary according to the position in which the said stock is set, the width of the strip cut and its bevel or angle, by means substantially as described.

26,978.—Matthew Edwards, of Cambridge, Mass., for a Process for Coloring the Surface of Metals:

I claim the new process, substantially as described, for coloring, darkening or bronzing metals, when the same is applied to metals that have had a previous deposit of white metal upon them.

26,979.—Andrew Ferber, of Elizabeth, N. J., for an Improvement in Shutter-fasteners:

I claim the plate, D, attached to the shutter or blind, C, provided with the hook, b, and the socket, c, the curved rod, E, provided with the eye, f, and the sphere or ball, e, which is fitted in the socket, c, and the pins in the sill, B; the whole being arranged substantially as and for the purpose set forth.

[The object of this invention is to obtain, for window shutters and blinds, a fastening by which the shutters, by a very simple manipulation, may be secured in an open and closed state, and also secured at any intermediate points between those positions without depending upon any fixtures connected with the outside of the building beyond the window sill; and thereby avoiding the necessity of extending the body and arm through the window in order to adjust the fastening and shutter.]

26,980.—Chandler Fisher, of Milton, Mass., for an Improved Curtain Fixture:

I claim hanging the spool end of the curtain rod upon the curved spring, g, attached directly to the bracket, C, as set forth, for the purpose specified.

26,981.—John M. Forrest, of Norfolk, Va., for an Improvement in Carriage Springs:

I claim a carriage spring, constructed, arranged and operating substantially in the manner described.

26,982.—Dennis C. Gately, of Newtown, Conn., for an Improvement in Manufacturing Rubber Belting:

I claim the method described of manufacturing belts or bands of india-rubber or gutta-percha, the same consisting in placing them in contact with smooth plates of metal and then heating them, substantially in the manner and for the purposes specified.

26,983.—A. Geiger, of Dayton, Ohio, for an Improvement in Burners for Vapor Lamps:

I claim making the cone piece, I I (which contains the non-conducting cork), with a break in the metal at the upper end of the cone piece between I I and B2 B2, this space being occupied by a ring of cork instead of the metal, so that the heat of the burner and cap may not be conducted down the tube, I I, substantially as set forth.

26,984.—Edgar Haight, of Buffalo, N. Y., for an Improved Paddle Wheel:

I claim, first, The arrangement of the rings, F F', rods, d, and trunnions, E E', or their equivalents, in combination with the buckets, D, pins, v, and guides, e, or their equivalents, constructed and operating substantially as and for the purpose described.

Second, Giving to the buckets a complete revolution around the

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pins, b, from which they are suspended, substantially as specified, so that they strike the water with the fast edge in advance, in whatever direction the wheel revolves.

Third, The employment of the links, c, substantially as described, for the purpose of connecting the rings, F F', with the rims, A A', of the wheel.

[This paddle wheel obviates the difficulties generally arising with feathering buckets; it works with equal power in both directions, and the buckets are firmly retained on both edges as they strike the water, so that they are not liable to work loose or to be knocked off if they strike a log or any other obstruction floating on the water. The buckets are arranged very ingeniously so that they pass through the air edgeways, and that they strike the water with the fast edge ahead, in whatever direction the wheel revolves, and the friction created by the working parts of the wheel are inconsiderable when compared with the advantages derived from the feathering motion of the buckets.]

26,985.—Lewis Harper, of Riceville, N. J., for an Improvement in Fertilizers:

I claim the method or process of making a fertilizer, by the employment of the described substances in the manner set forth, consisting of the series of steps specified, and resulting in a single compound or material, substantially as and for the purposes described.

25,986.—Forrest H. Harwood, of Rushville, N. Y., for an Improved Mortising Machine:

I claim, first, The lever, A, when hung and constructed to act substantially as described, in combination with the mandrel box, H, provided with rollers, jaws or clips, c c, at its one side, for the hooked arm, b, of the lever to gear with, essentially as set forth.

Second, The combination, with the sliding mandrel box, H, and mandrel raising spring, L, of the adjustable upper mandrel roller, M, for operation in connection with the lever, A, substantially as and for the purposes set forth.

26,987.—Wait N. Hawley, of Hartford, Conn., for an Improvement in Machines for Pegging Boots and Shoes:

I claim, first, An adjustable stock, H, secured and operating upon a two-way carriage, D E, and the frame, C, having a perpendicular movement, arranged and operating as and for the purpose described.

Second, I claim the arrangement of the rough surface feed wheel, R, in combination with the adjustable stock, H, carriage, D E, and frame, C, operating as and for the purpose described.

Third, The arrangement of the roughened surface feed wheels, R R', operating together as and for the purpose described.

26,988.—William H. Hendrick and Joseph Jacobs, of Mount Vernon, Ohio, for an Improved Back Rest for Lathes:

We claim the curved arm or bar, B, provided with two or more adjustable rollers, C, and secured at its lower part in a box or socket, A, substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple and more efficient device than has hitherto been employed for supporting work while being turned, so as to prevent any tremor of the same and effectually resist the pressure of the tool on the work, thereby insuring the even or true turning thereof.]

26,989.—Luther E. Higby, of Shelburne Falls, Mass., for an Improved Pastry Board:

I claim the combination and arrangement of the frame, A, rolling pin, B, crank, C, pieces, D, with the adjustable board, F, rack, H, and pinion, I, substantially as and for the purpose specified.

36,990.—Joel Hood, of Milwaukie, Wis., for an Improvement in Car Couplings:

I claim, first, The arrangement of the coupling pin by its arm to the coupling box, and in relation to the service pin, so that itmay be operated as set forth.

Second, The arrangement of the stirrup, with its rollers and links and levers, in relation to the draught bar, so that the bar may be adjusted as described.

26,991.—William H. Hope, of Washington, D. C., for an Improvement in Revolving Cutters, Ice-shavers, &c.:

I claim the peculiar-shaped and arranged central bit or knife, c k, in combination with the revolving disk, D, presser, P, and hopper, H, or with apparatus substantially the same, for the purpose specified.

26,992.—Thos. P. How, of New York City, for an Inkstand:

I claim the combination of the measuring cup, by which the supply of ink to the fountain or dripping cup is accurately graduated, with the piston, and the device for closing the tube at the end of the stroke, substantially as and for the purposes set forth.

26,993.—Samuel Hoyt, of Wilmington, Del., for an provement in Mill Spindles:

I claim the combination of the sliding plug, E, ball and socket bearings, C e C', and slotted spindle, B b, substantially as and far the purposes set forth.

26,994.—Nikolaus Hotz, of Trenton, N. J., for an Improvement in Nozzles for Hose Pipes:

I claim, as a new article of manufacture, a hose nozzle constructed as set forth.

26,995.—John Keane, of New York City (assignor to himself and W. H. Bartholomew, of same place), for an Improved Water Closet:

I claim the auxiliary lever, f, operating the cock or valve that supplies water to the closet, when combined with the pan lever, d, and pull, e, substantially as described.

26,996.—James M. Kern, of Morgantown, Va., for an Improved Washing Machine:

I claim, in combination with the dasher, E, and inclined board, c, the openings, d, valve-covered opening, g, and filtering diaphragm, p, communicating with the chamber, E; the whole being arranged and operating substantially in the manner and for the purpose described.

26,997.—Lewis Kirk, of Reading, Pa., for an Improvement in Brick Machines:

I claim, first, The double hoppers, x and z, in combination with the flexible hose, v, when constructed and arranged as and for the purpose set forth.

I also claim the flanged box, i, and piston, j, in combination with the reciprocating mold, U, and cross head, H, when constructed, arranged and operated as described and for the purpose set forth.

26,998.—A. Lafever and George C. Barnes, of Battle Creek, Mich., for an Improved Back Center for Lathes:

I claim the valve stem, b, spring, c, and cup, D, applied to the stock or shank, A, essentially as set forth, arranged and operating so as to feed oil from a cup or other suitable receptacle to the object to be turned.

[This invention consists in oiling the center point or that point against which the wood to be turned abuts, by causing the oil to flow from an oil cup through the end of the shank and to the point of a valve stem which, when not in use will prevent the oil contained in the oil cup from flowing out; and it further consists in tapping the valve stem in the front end of the shank and introducing a screw cap, so that the self-oiler may be applied to old shanks, by removing the old center points.]

26,999.—John W. Latcher, of Northville, N. Y., for an Improved Printing Press:

I claim, first, The employment or use of two platens, H H, arranged with two beds, E E, and used in connection with a frisket, U, so arranged as to pass down between one platen and bed to receive one impression, and then rise and pass down between the other platen and bed to receive the other impression, substantially as described.

Second, In combination with the platens, beds and frisket, arranged as above, an inking device composed of the cylinder, S, distributing rollers, i', dipping roller, e', and fountain roller, h', in connection with the rollers, y, attached to the frisket, U; the whole being arranged for joint operation substantially as described.

Third, Securing the forms, B', in or on to the beds, E E, by means of the movable jaws, j2, fitted in the upper and lower parts of the beds, and connected to the right and left screw shafts, u2, substantially as described, to admit of the simultaneous movement of the upper and lower jaws for the purpose of securing the forms centrally to the beds.

Fourth, Giving the blanket, X, of the second impression platen, H, a movement by means of the ratchet, s*, connecting rods, v* v*, shafts, w* a2, and rod, g*, put in motion by the movement of said platen and the stationary pawl, t*, at the under side of the fly board, C, substantially as and for the purpose set forth.

Fifth, The arrangement as shown of the crank, N, rod, P, and radius bar, Q, provided with the slotted segment, h, in connection with pinions, s s, racks, t t, and shafts, l p, for the purpose of operating intermittingly the frisket, U.

Sixth, The arrangement of the cam, h2, hollow cylinder, e2, and rod, d2, the latter being attached to the fly by the crank, h2, for the purpose of operating the fly as set forth.

Seventh, The operating of the griper shafts, r' r', by means of the double journal boxes, g2, attached to the hollow cylinder, p'', the pinions, u', on the shafts, r' r', the geared segment, w', gearing into pinion, u', of the hollow cylinder, the arms, x, x'', provided with springs, y' y'' and the dog, z'', crank, a*, and the pin, c**, operated upon by the cam, h* W, substantially as set forth.

Eighth, Having the gripers, s', formed of two parts so that one part, d* may slide on the other part, e*, for the purpose specified.

Ninth, The employment or use of the paper-feeding apparatus composed of the disks or rollers, o*, placed on the shaft, p*, and the guards, q*, directly over the disks or rollers; the above parts being secured at the inner edge of the feed board, B, substantially as described.

27,000.—Rodulphus Lounsbury, of Fulton, N. Y. and Francis G. Wilson, of Ontario, N. Y., for an Improvement in Horse Rakes:

We claim the arrangement of the head, A, chains, F F, slide board, k, teeth, B, ropes, I I, with knotted ends, J, and pulleys, H H; the whole being constructed for joint operation, in the manner and for the purpose described.

27,001.—Thomas J. Mayall, of Roxbury, Mass., for an Improvement in Machines for Making Rubber Belting:

I claim, The improvement in the manufacture of machine belting or banding composed of a woven fabric covered on one or both sides with india-rubber or gutta-percha, which consists in forming the edges thereof by means of an organized machine having its essential feature, substantially as described.

Second, I claim the two revolving cutters arranged upon one and the same shaft to operate substantially in the manner and for the purposes specified, in combination with a suitable device for laterally adjusting the said cutters, so as to be adapted to the cutting off or removing of superfluous gum at the edges of belts of different widths.

Third, I claim the rollers, h h, or their equivalent acting as dies to form the belt and finish the edges thereof.

27,002.—Malcolm McDowell, of New York City and Norman W. Wheeler, of Brooklyn, N. Y., for an Improvement in Combining Locomotive Engines and Cars:

We claim the employment of a car body, substantially as described, in combination with a locomotive capable of action independent of the car, but when combined therewith, forming the entire support of the forward end of the car, the combination of the two being such as to firmly support the car body, preventing undue oscillation and vibration, while a sufficiently flexible connection is maintained to properly turn curves, &c.; all as specified.

27,003.—Ives W. McGaffey, of Buffalo, N. Y., for an Improvement in Straw-cutters:

I claim the arrangement of the cutters, I I and C, spring flaps, J J, triangular cutter, n, and corner piece, n', substantially as described, for the purposes specified.

27,004.—John Meese, Sen., of Milton, Ohio, for an Improvement in Beehives:

I claim providing the octagonal hive with central octagonal broad chambers, A and A', arranged in relation to each other and to the slides, H, and boxes, B C, in the manner described, for the purpose specified.

27,005.—A. G. Mitchell, of Lansingburgh, N. Y., for an Improved Machine for Shaping Hair Brush Blocks:

I claim, first, The pattern, M, placed on a center pin, l, and so arranged that it may turn thereon and cause both sides of the brush block to be presented to the cutters without changing the position of the block on the pattern or removing it therefrom.

Second, The combination of the bed, I, and plate, H, when connected together as shown to operate as and for the purpose set forth.

27,006.—Thomas Moffet, of Chicago, Ill., for an Improved Railroad Time Indicator:

I claim the plate having the rings, B B B, or their equivalents attached thereto, as and for the purposes specified, in combination with the movable tablets.

I also claim the arrangement of the rings whereby each ring is suitable for two trains, as specified.

27,007—Isaac E. Palmer, of Montville, Conn., for an Improved Bed Canopy:

I claim, first, The combination of the foot pieces, A, hinged together and locked in such a way as to form a clamp, as described, with pieces, B B' C'', when the same are constructed and arranged in the manner and for the purpose of forming a portable and adjustable stand for supporting canopy figure 3.

Second, I claim canopy of figure 3, consisting of pieces, F, jointed together at their center and connected to hoop or frame, C, by sliding metal ferrules, all combined as and for the purposes herein set forth.

27,008.—Herman Saloshinsky, of Boston, Mass., for an Improved Machine for Attaching and Finishing Boot Heels:

I claim the above-described machine consisting of the blocks, G I and H, with their awls and drivers and the mechanism for operating them, substantially as set forth.

Second, I claim, in combination with the above, the trimming-knife, P, operated in the manner substantially as described.

27,009.—J. S. Sanson, of Philadelphia, Pa., for an Improvement in Railroad Switches:

I claim the tilting plates, G G, provided with the flanches, f f', and arranged in relation with the loaded levers, H H', and the rails, A A C C, to operate as and for the purpose set forth.

[The object of this invention is to obtain a simple self-acting switch for city railroads, one that may be actuated by the passage of the horse and car over it so as to coincide or be adjusted in line with either the branch or main truck, as may be desired, no special adjustment being required in any case.]

27,010.—J. Scoville of Buffalo, N. Y., for an Improvement in Harvesters:

I claim, first, The combination of the hinged lever seat bar, E, with the slotted journal boxes, D, and axis, c, as and for the purpose shown and described.

Second, The employment of the slotted journal boxes, D, in combination with the traction wheel, C, and pinion, d, as shown and described, whereby said traction wheel is left free to rise and fall independently of the frame, A, for the purposes set forth.

[This invention consists in a peculiar manner of attaching the main frame of the machine to the driving and supporting wheel, and also in a peculiar manner of attaching the driver's seat to the machine, whereby the main frame and, consequently, the cutting device, is allowed to conform perfectly to the inequalities of the surface of the ground, independently of the driving or supporting wheel and the weight of the driver, as well as that of a portion of the main frame, transferred to the or supporting wheel.]

27,011:—John Sloan, of Pittsburgh, Pa., for an Improvement in Balanced Slide Valves:

I claim, first, The use of the wedge-shaped slide, x, in combination with the steam chest, said steam chest being adapted in form and size to the form and size of the valve, as described and set forth.

Second, The use of the projection, l, and opening, u, when used in connection with the guide and guard, 2, as described and for the purpose set forth.

Third, The use of the openings, r, in the valve, x, when used in connection with the steam chambers, l, in the cap, m, and the steam ports, s, of the cylinder, as described and for the purpose set forth.

27,012.—C. M. Spencer, of Manchester, Conn., for an Improvement in Machinery for Spooling Thread:

I am aware that machines have long been in use for winding thread with a shaft to carry the spool, a transverse rod to carry the thread guide, operated by a right and left hand screw, with half nuts alternately in gear with said screw and changed by hand; therefore I make no claim to these devices, except in combination with the devices which I have applied to make the machine automatic or self-operating.

But I claim the arm, a, in combination with the arms, N N, shaft, K, arm, I, and inclined plane or pin, i, for the purpose of operating the block, L, so as to change the motion of the traverse rod, as described.

I also claim the arm, J, provided with a slide, m, constructed so as to operate, substantially as described, in combination with the block, L, for the purposes set forth.

27,013.—George A. Stone, of Roxbury, Mass., for an Improvement in the Apparatus for Superheating Steam:

I claim the combination, substantially in the manner and for the purposes specified, of these four things, viz.:—

1st, A superheating chamber provided with flues, or their equivalents, for the passage of heated gases or flame, and with passages for the entrance and escape of steam.

2d, A steam jet pipe, leading into a passage or pipe connecting with the flues and receiving steam from the chamber or boiler, and discharging it so as to make or increase a draft through the flues.

3d, A valve in the jet pipe.

4th, A rod, or its equivalent, exposed to the heat of the superheating chamber and acting upon the valve, substantially in the manner specified.

The whole combination being substantially such as is described, and acting to supply or furnish superheated steam at a nearly constant temperature.

27,014.—François Vouillon and Ferdinand Tavernier, of Paris, France, for an Improved Manufacture of Yarn. Patented in France, Oct. 6, 1859:

We claim the manufacture of yarn by submitting slivers or rovings, made by a carding-machine, wool-comber or otherwise, to a process of felting, as set forth.

27,015.—Loren J. Wicks, of New York City, for an Improvement in Skates:

I claim the attachment of a hinged or jointed platform to the rigid runner of a skate, when the platform is so connected and attached to the rigid runner as to allow the platform to conform to the spring or movement of the foot of the wearer, as set forth.

27,016.—William W. Wilcox, of Middletown, Conn., for an Improved Sail Grommet:

I claim the employment of a separate eyelet, C, in combination with the flanges, A B, as and for the purposes shown and described.

[This invention consists in the employment of an eyelet separate from the two flanges, between which the canvass is secured, so that said flanges can be made of cast iron or of some other cheap metal, and that, when the grommet has to be taken off, both flanges are saved and can be used over again and again, nothing being required to re-fasten them but a new eyelet.]

27,017.—John P. Wilson, of Frankfort, N. Y., for an Improvement in Animal Traps:

I claim, first, The arrangement of the body, A, and hammer, D, with the cord, H, pulley, G, and barbed rod, I, the same being connected and used substantially as and for the purpose specified.

Second, The employment of the stud, F, which screws into the end of the body, A, and which holds the pulley, G, substantially as set forth.

Third, The employment of the screw, K, the head of which is provided with the groove, n, into which the enlargement, I', on the rod, I, passes for the purpose of securing the trap to any object to which it may be attached, substantially as described.

27,018.—Alva Worden, of Ypsilanti, Mich., for an Improved Holder for Tinman's Shears:

I claim the circular revolving perforated metallic or other plate, C-1, Fig. 2, so adjusted in the circular metallic or other ring, A-1, Fig. 1, that the shears and stakes of the tinner may be placed in the holes, D E F G, Figs. 2 3 or 4, so that, by the rotary motion of the plate, C-1, Fig. 2, which is held in place by the bolt, Fig. 3, the workman may, at pleasure, change the position of his shears and stakes without removing or lifting them from their places, and the use of such a combination as a holder or stand for tinner's shears and stakes.

27,019.—McClintock Young, Jr., of Frederick, Md., for an Improved Heel Spur:

I claim my improved equestrian heel spur, the said spur being formed essentially of the heel-shaped open frame, a, and its projecting hollow arm, b, combined with the slit-headed screw shank, d, and its rotating spur head, e, substantially as forth.

27,020.—George Edwards (assignor to himself and Geo. M. Rice), of Worcester, Mass., for an Improved Variable Exhaust Pipe for Steam Engines:

I claim the described expanding nozzle, consisting of the elastic curved flaps, B B2, in combination with the containing case, A, operas set forth, for the purpose described.

27,021.—Joseph H. Jenkins (assignor to himself and Elijah W. Jenkins), of Smithville, Mo., for an Improved Sawmill:

I claim the employment of the armed rockshaft, I, pitman, H, eccentric, G, and hinged swinging frame, L, in combination with a reciprocating saw sash, in the manner and for the purpose described.

[This invention consists in the arrangement specified in the above claim, whereby the saw, although it is thrown off from the log and made to assume an inclined position as it ascends, is brought against the log and made to retain a perpendicular position while it is descending. Heretofore, in sawmills, this end has not been attained, because the eccentrics which are used to pitch the saw from and toward the log have not been combined with a controlling and compensating frame such as Mr. Jenkins employs, and, consequently, they have been allowed to incline the saw just as much in its descend-

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ing movement as they are allowed to incline it in its ascending movement. It is desirable to have the saw inclined as it rises in order to clear the log; but it is not desirable to have it inclined as it descends, because, if it is inclined at this stage of the operation, the saw will not come in contact with the log until considerable of its lower portion has passed down below the log, and thus the action of said portion of the saw on the log lost. This appears to be a very clever arrangement.]

27,022.—Richard Lamb (assignor to himself and Joseph Lamb), of New York City, for an Improvement in the Manufacture of Artificial Marble:

I claim, first, The described method of arranging the veining in artificial marble, that is to say, the separation of freshly mixed cement into balls of irregular sizes by agitating with dry cement, the application of one or more colors to the surfaces thereof, and compressing the balls together before they have commenced to set.

Second, Applying the coloring matter, in the form of a dry powder, to the surface of the balls, substantially as described.

Third, Mixing the coloring matter with pulverized cement, and distributing such mixture in a dry state among the balls, for the purposes set forth.

27,023.—Eugene M. and James E. Mix (assignors to W. T. Huntington and Harvey Platt), of Ithaca, N. Y., for an Improvement in Calendar Clocks:

We claim the employment of a year wheel, K, and detached leap year wheel, L, applied and operating together substantially as described, in combination with a detent, J, or its equivalent, and a wheel, F, of the construction specified.

27,024.—Kingsley R. Olmstead, of Chicago, Ill., assignor to Giles F. Filley, of St. Louis, Mo., for an Improved Sawing Machine:

I claim the combination of the friction roller, j, and slotted plate, h, with the scale, g, hand lever, I, set lever, H, set rod, D, and sliding racks, C C, arranged and operating substantially in the manner and for the purposes as specified.

I also claim the combination of the eccentrics, o o, and off-setting plates, S S, with the bedplates, T T, connecting rod, U, and clutch lever, O, constructed and operating for the purposes substantially as described.

27,025.—Benedict Treuller (assignor to himself and Samuel W. Weiss), of Dale, Pa., for an Improvement in the Process of Manufacturing Steel:

I claim, in connection with pulverized charcoal, the cyanide of potassium, sal ammoniac and borax, as stated, the whole being used in the manner substantially as set forth.

27,026:—Sylvenus Walker (assignor to W. P. Spencer and J. F. Adams), of Boston, Mass., for an Improved Table Leaf Support:

I claim, as my invention, the joint formed by the brace, A, combined with bracket, B, and spring, a, as set forth and for the purpose specified.

27,027.—Henry B. Barber, of Scott, N. Y., for an Improvement in Devices for Raising Water:

I claim the gears in combination with the clutch, two-armed lever and beveled or cam-shaped pins, P P, substantially as described, for the purpose of automatically changing the motion of the pulleys, H H', when the buckets are emptied; the whole being constructed to operate substantially as described for the purposes set forth.

RE-ISSUE.

Alexander Beckers, of New York City, for an Improved Apparatus for Exhibiting Stereoscopic Pictures. Patented April 7, 1857:

I claim a stereoscopic apparatus made to contain a number of stereoscopic pictures, said pictures being attached to an endless belt, band, cord, chain or apron, C, moved by a roller, axle or pulley connected with an external handle, the rotation of which causes the successive presentation of the said pictures to the eyes, substantially as described; and I also claim the construction of the slides, D D, substantially as set forth, when combined with a stereoscopic apparatus.

DESIGNS.

James Bogle, of West Newton, Mass., assignor to himself and Daniel Bogle, of Dover, N. H., for a Design for Floor Oil Cloths, (2 cases).

Notes & Queries

H. C. G, of Mass.—You will find the answer to your first question for the year 1858 in the report of the Commissioner of Patents, just published. Our own copy has gone to the bookbinder's, or we would give you the fact. It is a shame that practical men like yourself should not have these reports. We should be pleased to receive your communication if you will tell what you have observed yourself, and actually know.

I. N. M., of Ill.—The instrument which photographers employ for taking pictures is a portable camera-obscura. A camera-lucida is constructed upon the same principles exactly, only it has an opening in the side for the hand to pass into the chamber, so as to sketch, with a pencil, the picture thrown down upon a sheet of paper.

J. T., of N Y.—To make an emery belt, a coat of glue is first put on; then the fine emery dusted and pressed into the glue, and the whole allowed to dry thoroughly. Three successive coats of this kind make a good belt. Copal varnish may be employed in place of glue; it will endure longer, and will not be so readily affected with moisture.

E. P, of Mass.—The "Metal-workers' Assistant," published by H. C. Baird, of Philadelphia, appears to be the work which you require for information in making alloys. In melting several metals for obtaining a hard alloy, always fuse the most refractory first; then add the others, according to their melting-points, such as the copper first, then the tin, in making bronze; or first the copper, then the zinc, in making brass. As zinc is volatile, it should be melted as quickly as possible, because long exposure to heat will carry off some of the metal in the condition of gas.

J. M. P., of Ohio —Mix one ounce of oxyd of manganese and eight ounces of charcoal dust with 20 pounds of scrap iron in a crucible, and smelt them in a furnace, and you will obtain a tolerable cast steel, adapted to making the bells to which you refer.

G. R., of N. Y.—Your boiler appears to be about eight horse-power. See directions for estimating it in another column. It is sufficient to drive a 20-inch circular saw, with a good engine, but yours is too small to suit our ideas, the diameter of the cylinder being but 5½ and the stroke 10 inches. The diameter should be 8 and the stroke 14 inches.

D B., of Pa.—The coating for the back of looking-glasses is composed of tin and mercury. In applying it, the tin sheet is spread upon a smooth and level table of marble or free-stone, and the wrinkles smoothed out with a brush. A small quantity of mercury is then poured upon the tin, which dissolves it, or, rather, amalgamates with it. Two parallel rulers are next placed upon the tin, and mercury poured between them to a depth equal to the thickness of a half dollar. A strip of paper is advanced half an inch on the edge of the mercury, and the plate of glass (previously polished and dried) is pushed endwise upon this sheet of mercury; care being taken to keep it in a horizontal position, so that no air can come between the glass and metal. Heavy weights are applied to the glass, and the table tipped gradually more and more to drain off the loose mercury—a process which occupies from three weeks to a month.

F. I. M., of Mass.—There is no subject more clearly demonstrated than latent heat, as now generally understood. A gallon of water converted into steam at 212°, will heat 5½ gallons of water to 212°; thus affording evidence of latent heat in the steam.

W. E. D., of Ohio.—A good water-proof blacking for the edges of boots and shoes can be made by dissolving 1 ounce of india-rubber in hot oil, stirring in 7 ounces of fine ivory black, 5 of molasses, and 1 of gum arabic. These are mixed thoroughly in a mortar; then taken out, placed in an earthen vessel, and 1 ounce of sulphuric acid stirred thoroughly among them. This composition must be stirred frequently for about six days, when it is ready for use.

W. C., of N. Y.—Your method of operating a series of reciprocating paddles, so as to permit them to open and close like a duck's foot, is quite old, and was used by the Earl of Stanhope before paddle wheels were tried.

C. C. S., of Minn.—The terms "Burnettizing" and "Kyanizing" timber relate to the name of persons in Europe, who used different mineral solutions for impregnating the wood. The one used chloride of zinc, the other corrosive sublimate. The method of impregnating the timber is to place it in a strong close iron vessel, and force in the liquor through all the pores by a hydrostatic pump. By steeping the timbers of your paper mill for one day in a tank containing a solution of the sulphate of copper (about 1 pound to every 20 gallons), then drying them well, they will last at least twice as long as unprepared timber. Raw flax, in any form, is too dear for making paper; this is the sole objection to its use. To make paper from it, there is no difference in the process from that of making paper from old ropes and the waste of cotton factories, as is practiced in many mills.

J. T., of N. Y.—The air pump in a condensing engine performs a double duty; it introduces the cold water for condensing the steam, and it expels the incondensable gases, such as atmospheric air, carbonic acid, ammonia, &c., which are absorbed by water, and thus find their way into the boiler. The proper velocity for a governor depends mainly on the variety used; Porter's requiring to be driven much faster than most other kinds. The object of the vacuum in a condensing engine is to remove the back pressure of the air from one side of the piston when the steam is pressing on the opposite side. The vacuum is never perfect, and the gage indicates the difference between the outward pressure of the steam remaining uncondensed, and the pressure of the air inward from the outside.

A. L. C., of N. Y.—The rapid drying of wet clothes and plaster in a clear freezing atmosphere is due to the absence of moisture in the air. Evaporation goes on in a dry atmosphere at all temperatures. The smoke which you see near the surface of a river, on a very cold day, is the evaporated moisture which is being condensed by the cold a short distance above the surface. In the Arctic regions wet clothes dry nearly as fast as in our climate in a warm day, because the atmosphere in the frosty regions contains little or no moisture.

M. A. M., of Mass.—You can transfer prints on paper to wood, or to a glass surface, by the use of white varnish. First place a thin coat of the varnish on the wood or glass and allow it to become nearly dry; now lay the picture upon this, face downwards and press it out smoothly, so that it will adhere perfectly in every part. After thus remaining for six hours, rub off the paper with the finger and some water. When this is done cautiously the picture will be found adhering to the varnished surface.

J. T., of Ill.—We do not know where you can obtain natural liquid india-rubber. The common kind, when dissolved in naphtha, dries well, and although not so soft is as tenacious as the natural product. Vulcanized rubber is more tenacious than the natural kind.

S. W, of N. Y.—We do not know where you can obtain a treatise on the construction of sounding-boards for pianos and violins.

C. Q. L., of Mo.—In all likelihood your chimney smokes because it is too low. Its draft will be greatly increased by adding to its hight, or by putting a common chimney-cap upon it. The higher the chimney the better the draft.

E. A. W., of Pa.—A good paste for case-hardening iron is composed of equal parts of the yellow prussiate of potash and starch. Apply it as as a thick paste on the iron; allow it to dry; then heat it red-hot in a clear fire, and plunge it into cold water.

G. F. C., of Sandwich Islands.—Ivory and bones can be reduced to a liquid state by hydrochloric acid, but this liquid would be of no use to you for molding articles to render them similar to ivory in appearance, and of any form desirable.

W. H. W., of Ind.—Any good lacquer laid upon tin gives it the appearance of copper or brass. It is made by coloring lac-varnish with turmeric to impart the color of brass to it, and with annatto, to give it the color of copper. If a tin plate is dipped into molten brass, the latter metal will adhere to it in a coat.

T K., of Ohio.—You will find something to suit you about boilers on another page of the present number, in which the whole tube surface is allowed. Efficient heating surface is considered by most persons as amounting to only one half of the flues or tubes; but for short boilers, the whole tube surface may be considered efficient, we believe. Clarke, in his work on locomotives, takes the whole surface in what he calls the "slump," and for locomotives he may be right.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Feb. 4, 1860:—

H. L. B., of Ill., $25; J. B. McE., of Pa., $30; G. P., of Pa., $25; A. C. B., of Pa., $25; C. & McC., of Iowa, $25; R. P. C. of Wis. $30; McN. K. M. Co., of N. Y., $800; C. J. F., of Iowa, $30; L. S. L., of R. I., $25; G. W. R., of N. Y., $60; G. C., of Pa., $275; L. A. B., of N. Y., $25; F. D., of Conn., $25; J. T. L., of N. Y., $50; T. B. L., of Mich., $30; J. L. H., of N. Y., $30; E. B. W., of Ill., $30; A. A. M., of N. Y., $30; J. Van V., of N. Y., $25; S. A., Jr., of N. Y., $35; M. V. B., of N. Y., $25; F. D. L., of N. Y., $57; J. M. D., of Ind., $30; H. U., of N. Y., $10; C. S. L., of Ind., $30; I. G. C., of Ill., $25; I. M. S., of Ind., $30; S. B. D., of N. Y., $60; G. C. & Co., of Tenn., $60; J. D. B., of N. C., $30; C. P. B. & Co., of Conn., $30; A. S., of N. J., $10; H. N. B., of N. Y., $10; E. K., of Pa., $30; I. H., of Ill., $30; M. S. S., of N. Y., $30; T. & R., of N. H., $30; M. H., of Conn., $25; C. H. S., of Conn., $4; C. M., of N. Y., $30; J. L. R., of N. Y., $25; W. B., of Pa., $25; E. M., of N. Y., $30; B. L. D. S., of Cal., $30; J. S. H., of Ind., $30; I. P., of Pa., $25; W. R. T., of Pa., $25; G. H. C., of S. C., $30; D. B., of Va., $30; I. N. R., of Iowa, $30; Mrs. P. C. Y., of N. Y., $25; F. & B., of Pa., $25; W. J. McC., of N. Y., $30; B. W. T., of N. Y., $30; W. H. P., of Ind., $25; R. B., of N. Y., $30; L. S., of Pa., $30; J. G. I., of Ohio, $25; C. & G. M. W., of N. Y., $30; G. H. B., of Ill., $30; M. W. N., of N. Y., $25; T. R. T., of N. Y., $105; W. D. G., of N. J., $25; I. T., of N. Y., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Feb. 4, 1860:—

W. J. J., of Mass.; H. & S., of R. I.; F. & B., of Pa.; Mrs. P. C. Y., of N. Y.; J. G. C., of Ill.; W. R. T., of Pa.; J. M. H., of N. Y.; S. A., Jr., of N. Y.; I. G. J., of Ohio; C. H. S., of Conn.; M. V. B. B., of N. Y.; M. B., of N. Y.; W. E. B., of N. Y.; L. S. L., of R. I.; W. D. G., of N. J.; C. & McC., of Iowa; G. P., of N. Y.; L. A. B., of N. Y.; M. H., of Conn.; W. H. P., of Ind.; I. B., of N. J.; C. V., of N. Y.; H. L. B., of Ill.; J. Van V., of N. Y.; J. L. R., of N. Y.; A. C. B., of Pa.; J. H. McC., of N. Y.; F. D., of Conn.; S. M., Jr., of N. Y.; W. B., of Pa.; M. W. N., of N. Y.; J. T., of N. Y.

Literary Notices.

A GUIDE TO THE KNOWLEDGE OF LIFE. By Robert James Mann, M. D. C. I. Francis & Co., publishers, 554 Broadway, this city.

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THE MATHEMATICAL MONTHLY. Ivison, Phinney & Co., publishers, this city.

The January number of this patrician magazine has been laid upon our table. The most interesting article in it is the one by Mr. Newcomb, on the "Theory of Probabilities," which is of special importance at the present time, from its use in investigating the structure of the stellar universe—one of the most sublime problems that has ever engaged the attention of men.

THE HAUNTED HOUSE. T. B. Peterson & Bro., publishers, Philadelphia.

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ALL THE YEAR ROUND. Charles Dickens, editor, and J. M. Emerson, & Co., No. 37 Park-row, this city, re-publishers.

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W. H. FERRIS, AGENT FOR TRAPP'S PATENT Barrel Machinery; Stave and Heading Saws on hand, at Elmira, N. Y. 7 4*

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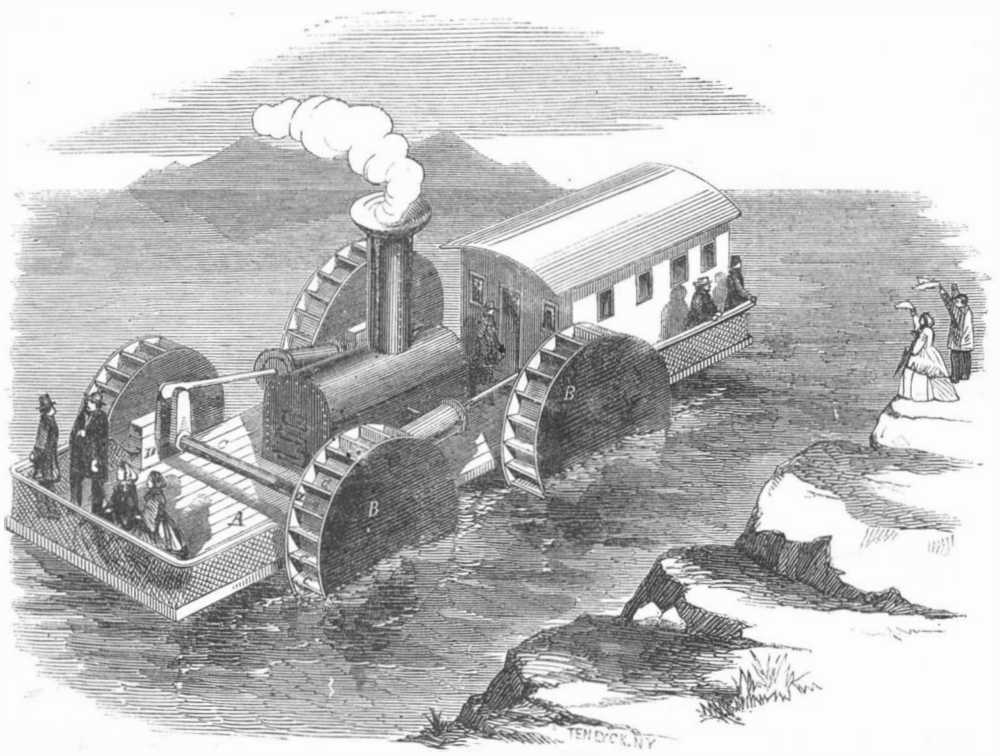
IMPROVED MARINE LOCOMOTIVE

The boldness of thought among the inventors of the present day is shown in no department more strikingly than in that of navigation, and one of the most remarkable instances of it is in the plan illustrated in the annexed cut. Several plans have been devised for running vessels on the surface of the water, but this idea is of course an absurdity; every body floating on the water must displace an amount of water equal in weight to itself; in other words, it must run through the water and not over it. The inventor of this contrivance, whatever other errors he may commit, does not fall into this fallacy. He says that it is now generally assumed that the resistance of a steamboat moving through the water is in proportion to the cube of the velocity, and he proposes to avoid this rapidly augmenting resistance as the velocity is increased, by making the wheels sufficiently buoyant to support the vessel with its load above the level of the water, so that the whole resistance to the progress of the vessel is confined to the wheels.



HOPKINS' IMPROVED MARINE LOCOMOTIVE.

The platform, A, is hung upon axles, C C, of the wheels, B B, which are made in the form of water-tight drums sufficiently large to float the whole apparatus. The rims, *a a*, of the wheels extend to the outward edge of the buckets, *b b*, and the cranks are turned by engines in the usual manner. It is proposed to immerse the wheels about one-third of their diameter, and their number may be increased indefinitely. Of course, if a sufficiently rapid revolution of the wheels could be obtained, this plan would produce a vessel that would run with great velocity, and the only way to determine whether such revolution can be obtained is by trying the experiment.

An application for a patent for this invention has been made through the Scientific American Patent Agency, and persons desiring further information in relation to it will please address the inventor, O. Hopkins, No. 90 Third-avenue, this city.

SOLID EMERY VULCANITE.

Many attempts have been made to produce a solid emery wheel, for the purpose of cutting, grinding and polishing metals; but until now we have never seen anything which could practically hold the emery in place better than the ordinary mode of covering a wheel with glue, and sprinkling emery upon it. After years of experimenting, however, Mr. Thomas J. Mayall has produced the desired result, if we can judge by the wheels we have seen in operation cutting hardened steel, and by the testimonials of those using them. The emery is incorporated with india-rubber and sulphur, and while in a plastic state, is put into molds and submitted under great pressure to a high degree of heat, according to Goodyear's patent for vulcanizing; this converts it into a solid granular mass, resembling granite or iron. It can be made of any desired grade of emery, and used either dry or with oil or water. The wheels can be turned off in a lathe running very slow in the same manner as iron is turned, which will enable parties using them to turn the face of the wheel to conform to work of any irregular shape or to "true" them if necessary.

The New York Belting and Packing Company, whose manufactory we minutely described on page 169, Vol. I. (new series). SCIENTIFIC AMERICAN (which article was deemed of so much public interest that it was copied verbatim in *Newton's London Journal*), are now manufacturing this "Solid Emery Vulcanite;" and those interested can obtain further information by sending for a circular, or calling to see the wheels in operation, at their warehouse, Nos. 37 and 38 Park-row, New York.

STEAM FIRE-ENGINES.—The mayors of six cities in Massachusetts have recently addressed messages to their several cities, recommending them to get steam fire-engines as early as possible. One or two new steam fire-engines have lately been built in London, England.

IMPROVED GRIDIRON.

One of the most singular of all the facts of nature, is the obstruction offered to the passage of flame by wire gauze. A burning lamp or candle surrounded by this apparently frail protection may be carried through a chamber filled with explosive gases with perfect impunity. This is the arrangement of Sir Humphrey Davy's famous safety lamp for preventing the explosions of inflammable gases in mines. The explanation generally given is that the wire cools the gas as it passes through the meshes, below the temperature at which it combines with oxygen. This singular power of gauze to cut off flame is used in the invention here illustrated, to prevent the burning of meat while it is being broiled upon a gridiron.

Fig. 1

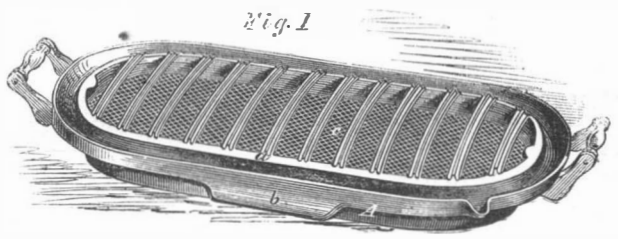
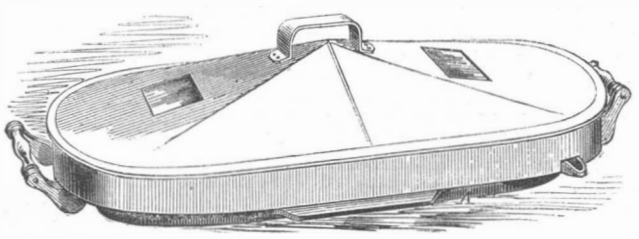


Fig. 2



TREADWELL'S IMPROVED GRIDIRON.

Fig. 1 represents the utensil with the cover off, and Fig. 2 with the cover over it; this cover being made of tin with mica windows through which the progress of the cooking may be watched. The frame, A, is of cast iron in the proper form to fit the stove on which it is to be used, with the flanges, *b*, to support it. This frame supports the gridiron, *d*, and has the wire gauze, *c*, seen through the bars of the gridiron, covering its bottom. If this gauze is of proper fineness, unless it becomes red-hot, it will cut off the flame arrising from the fire and from the dripping grease, and thus prevent it from burning the meat.

The patent for this invention was issued, Dec. 20, 1859, and persons desiring further information in relation to it will please address the inventor, John G. Treadwell, at Albany, N. Y.

THE GREAT ECLIPSE OF 1860.—M. Faye, in a memoir lately read before the French Academy of Sciences, suggests a concert in the observations to be made by astronomers upon the great eclipse of the sun on July 18, 1860, partial over a great portion of Europe and America, and total in Spain, Algiers and Morocco, and a portion of North America. He recommends the establishment of stations with some degree of regularity along the path of the total eclipse. Among other recommendations to astronomers, in their observations, are, the study of the physical constitution of the sun; of the protuberances on the solar surface; the testing of the tables of the moon's motion; careful observations of meteorological phenomena, and magnetic variations; the taking of photographs, and the like, during the period of the eclipse.

MECHANICS

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A NEW VOLUME COMMENCED JANUARY, 2, 1860.

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